APPROVED MATERIALS AND MANUFACTURERS
INTRODUCTION

This document represents a listing of specific manufacturers whose products have been approved for use within Chesterfield County's water and sanitary sewer systems. The listing is divided into four sections. Sections 1 and 2 contain lists by type of material and indicate the approved product of each. Section 3 provides a listing of approved manufacturers followed by their addresses and local suppliers. Section 4 provides detailed materials specifications.

This listing is intended to be used as a reference source for the Utilities Department's employees, contractors and vendors. Materials produced by manufacturers not listed herein are not acceptable for use within the County's systems. Manufacturers interested in submitting products for evaluation and possible approval should communicate their interest to the Chairman of the Product and Design Review Committee, Utilities Department, County of Chesterfield, P.O. Box 608, Chesterfield, Virginia 23832-9998.

It should be noted that in some cases manufacturer approval is on a plant-by-plant basis. The Committee reserves the right to perform a comprehensive plant and product evaluation and testing based on Utilities Department's "Producing Plant/Product Evaluation Procedures", and at the sole option of the department, plant evaluations may be required on an on-going basis for new and existing facilities. The Committee also reserves the right to limit the number of approved manufacturers and products as they deem necessary to control parts inventory and maintenance/ training requirements.

Revisions to this publication will be made periodically. Users should inquire with the Utilities Department's Development Section as to availability. Questions concerning the information contained in the listings should be referred to the Product and Design Review Committee. Any errors or omissions should be reported to the committee immediately. Utilities Department will not allow the use of products and materials identified incorrectly in this publication.

A certification letter (sample following) shall be submitted by the manufacturer/supplier prior to the contractor beginning construction. Further details regarding submittal of shop drawings, etc. can be found in Part III and Part IV of this document.

SAMPLE CERTIFICATION DOCUMENT

(Company Letterhead)

DATE___ _

UTILITY CONTRACTOR
NAME AND ADDRESS

Re: (COUNTY OR DEVELOPER PROJECT NAME)
(COUNTY UTILITY PROJECT NUMBER)

Gentlemen:

We are supplying the following materials for installation on the above referenced project:

(MANUFACTURERS' NAME) (ITEM/PRODUCT)
(List each item separately using as much space as required)

1. ____________________ ____________________
2. ____________________ ____________________
3. ____________________ ____________________

As Agent for the Manufacturer(s), we hereby certify that the items/products listed above to be installed on the referenced project comply with Chesterfield County's latest Water and Sewer Specifications and Procedures Manual, and any supplemental letters from the Product and Design Review Committee subsequent to the latest revision date of the County's Specifications.

Signature (Owner or Manager)

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State of ____________________,
City/County of ____________________, to-wit:

I,____________________,a Notary Public in and for the City/County and State aforesaid, do hereby certify that this day personally appeared before me in my jurisdiction aforesaid by: ____________________,whose name is signed to the foregoing writing dated ____________________, and acknowledged the same before me.

Given under my hand ____________________, 19 ____________________.

My commission expires: ____________________.

____
NOTARY PUBLIC

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cc: Senior Engineer, Construction Section,
Chesterfield County Utilities Department

DEPARTMENT OF PUBLIC UTILITIES
CHESTERFIELD COUNTY
APPROVED
MATERIALS LIST

(Minimum Criteria: Meets AWWA and/or ASTM Standards and Chesterfield County Design Standards, Latest Revisions)

SECTION 1: WATER SYSTEM

A. Pipes

1. C-900 or C-909 - P.V.C. (DR-18, CL. 150) (Sizes 6″, 8″ & 12″)

2. a. Class 51 minimum or higher classification depending upon design consideration. (Push-On and Mechanical Joint) (6″, 8″, 12″, 16″, 20″, 24″, 30″ & 36″)

   b. Restrained Joint Pipe (Pipe Application: Use only where mechanical joint pipe is not available or in vertical applications).

      1) Griffin Snap-Lok (6″ – 30″)
      2) American D.I. Pipe Flex-Ring (6″ – 36″)
      3) U.S. Pipe TR-FLEX (6″ – 36″)
      4) Clow Super Lock D.I. (6″ – 24″)
      5) McWane D.I. (30″ – 36″)

3. Prestressed Concrete Pressure (AWWA C301 as modified)

B. Valves

1. Resilient Seated Gate Valves (for main sizes 4″-12″ only)

   a. American Flow Control - Series 500
   Gate Valve with Non-Rising Stem (NRS)

   b. Clow R/W Valve

   c. U.S. Pipe - Metroseal 250: with non-rising stem (NRS) and outside stem yoke (OSY)

   d. M&H (Style 3067-NRS; 3068 OSY)

e. Kennedy (Model KenSeal II 4571RSGV)

f. Mueller A-2360 (Resilient Wedge)

g. American Flow Control - Series 2500 (Resilient Wedge)

2. Butterfly Valves (For Use on 16″ and Larger Lines)

a. Mueller - Lineseal III

b. DeZurik Baw AWWA

c. Pratt's Groundhog Class 150B and Triton HP-250

d. M&H Style 4500 (for 16″-24″)
and Style 1450 (for 30″-54″)

e. Mosser Series 810 & 830

f. Rodney Hunt Streamseal (24″ and Larger)

g. K-Flo 47 Series (30″-72″)

C. Fire Hydrants

1. Mueller Centurion A-421

2. Kennedy “K81D” (Dual rotated hydrant)

3. M & H Style 929 Reliant

4. U.S. Pipe - Metropolitan 250 (Model 94)

5. Clow Medallion

6. American Darling - Mark 73

D. Meter (Setters) Yokes

1. For 5/8″ Meters:

5/8″ x 7″ Riser Meter Yoke with one lockwing plug angle meter stop, with saddle nuts, ¾″ copper tube flare or compression inlet and outlet.

a. Ford

1) V71-7W-22-33
2) V71-7W-44-33G
(with compression connections inlet and outlet for copper pipe)

b. McDonald

1) 29-107WXCC33
2) 29-107WXTT33
(with compression connections inlet and outlet for copper pipe)

c. Mueller

1) H-1434
2) H-1470-5

Note: County requires manufacturer to supply these connections "completely factory assembled" and tightened to proper torque.

d. Hays (by Cambridge Brass)

1) Model # 6020-207H3H3V0

2. For 1″ Meters:

Commercial - Domestic use by Businesses, Doctors and Dentists Etc.

1″ x 12″ Riser Meter Yoke with two lockwing, ball or plug type angle stop on inlet and outlet, saddle nuts, copper tube flare or compression inlet and outlet with ball valve bypass.

a. Ford

1) VV74-12W-22-44 w/ball valve bypass
2) VVB-74-12W-22-44 w/plug valve bypass
3) VV74-12W-44-44G
(with compression connections inlet and outlet for copper pipe)

b. McDonald

1) 29B412WWCC443
2) 29B412WWTT443
(with compression connections inlet and outlet for copper pipe)

All Other Users i.e. for Irrigation, Residential, Etc.

1″ x 12″ Riser Meter Yoke with 1 lockwing ball or plug type angle stop on inlet only, saddle nuts, copper tube flare inlet and outlet. No bypass.

a. Ford

1) V74-12W-22-44
2) V74-12W-44-44G
(with compression connections inlet and outlet for copper pipe)

3. For 1½″ and 2″ Meters:

*a. Ford - for 1½″ Meter - VBB76-7B-11-66
and for 2" Meter - VBB77-8B-11-77
*b. Mueller (for both) - H-1423
*c. A.Y. McDonald - Model 20A609 WWFF 665 for 1½″ meter, Model 20A709 WWFF 775 for 2" meter

*These products are acceptable provided manufacturer makes the necessary modifications to comply with the County's materials specifications for 1½″ and 2″ water meter setters.

E. Corporation Stops - Plug Type only for ¾″ and 1″; Plug Type or Ball Valves for 1½″ and 2″

(¾″ thru 2″ with "cc" thread inlet)
1. Mueller

a. H-15000
b. H-15008 (¾″ and 1″ corp stop with compression outlet for copper) or
H-15071 (¾″ and 1″ connector only to convert a normal H-15000 corp stop to compression, to avoid using special tapping machine adapters)

2. Ford

   a. F-600 (Plug type with flare outlet only for ¾" and 1")
   b. F-1000-3G (¾" corp stop with compression connection for copper) or
      C04-33G (¾" connector only to convert a normal F-600-3 corp stop to compression, to avoid using special tapping machine adapters)
   c. F-1000-4G (1" corp stop with compression connection for copper) or C04-44G (1" connector only to convert a normal F-600-4 corp stop to compression, to avoid using special tapping machine)

3. McDonald

   a. 4701
   b. 4701-T (¾" and 1" corp stop with compression outlet for copper) or
      4700-T (¾" and 1" connector only to convert a normal #4701 corp stop to compression, to avoid using special tapping machine adapters)

4. JJC #J-1500

5. Ford FB-600 (Ball valve with flare outlet only for 1½" & 2")

6. Ford FB-100OG (Ball valve with compression outlet only for 1½" & 2")

7. Cambridge Brass

   a. 102-A Plug type with flare or compression outlet - ¾", 1", 1½", 2")
   b. 201-A Ball valve with flare or compression outlet - 1½", 2")

Compression Fittings - (for 1½" and 2" only)

1. Mueller 110

2. McDonald T-Compression

4. Ford Grip Joint

5 Cambridge Compression - CB

Curb Stops - ¾" and 1" copper flare, full port, ball or plug type curb stop, with or without check

		Copper Flare Plug Type	Copper Flare Ball Type
1.	Ford ¾"	Z22-333	B22-333
	Ford 1"	Z22-444	B22-444
2.	Mueller ¾" & 1"	H-15300	N/A
3.	McDonald ¾" & 1"	4713	6100
4.	Cambridge Brass ¾"	128-C3C3	202-C3C3
	Cambridge Brass 1"	128-C4C4	202-C4C4

Curb Stops - ¾" and 1" copper compression, full port, ball or plug type curb stop, with or without check.

		Compression Plug Type	Compression Ball Type
1.	Ford ¾"	Z44-3336	B44-3336
	Ford 1"	Z44-4446	B44-4446
2.	Mueller ¾" & 1"	H-15207	B-25209
3.	McDonald ¾" & 1"	4713-T	6100-T
4.	Cambridge Brass ¾"	128-H3H3	202-H3H3
	Cambridge Brass 1"	128-H4H4	202-H4H4

Curb Stops – 1½" and 2" pipe threaded or compression, full port, ball type curb stop, with or without check

		Compression Ball Type	Pipe Threaded Ball Type
1.	Ford 1½"	B44-6666	B11-666
	Ford 2"	B44-7776	B11-777
2.	Mueller 1½" & 2"	B-25209	B-20283
3.	McDonald 1½" & 2"	6100-T	6101

4.	Cambridge Brass 1½″	202-H6H6	202-F6F6
	Cambridge Brass 2″	202-H7H7	202-F7F7

F. Vaults, Precast Concrete - Requirements and configurations as shown on plans. (For other approved vaults, see "Water Meter Boxes" under Section 1).

1. Americast

2. Elite Fire Protection, Inc.

3. Tindall Vaults

4. Clear Flow Company

2. M&B (Model MB1500BF/WM with only the Ames 2000 series backflow device and Fire Protection Check Valve – Fig. 590F as manufactured by Grooved Sprinkler Company).

G. Tapping Sleeve - Sleeves must conform to County's latest application instructions as specified in Section 4 entitled Materials Specifications.

1. **(Fabricated Steel Sleeves)** with Epoxy Coating and Stainless Steel Bolts and Nuts

   a. Smith Blair (Rockwell Product) #622 (4″-30″)
   b. J.C.M. Industries #412 ESS (4″-48″)
   c. ROMAC # FTS 420 SS (4″-30″)
   d. Ford FTSC (4″-30″) w/SS bolts

2. **(Stainless Steel Sleeves)**

   a. Power Seal - Model 3480 AS and 3480 MJ (6″-24″)
      Model 3490 AS and 3490 MJ (6″-24″)
   b. ROMAC SST and SST III (6″-24″)
   c. Ford FAST (6″-24″)
   d. Cascade - Model CST-EX (4″- larger)
      Model CST-SL (4″-24″)
   e. JCM Model 432 (6″-24″)
   f. Mueller H304 (6″-24″)
   g. Dresser Style 630 (6″ – 12″)
   h. Smith-Blair Models 662 & 663 (4″-20″)
   i. Smith-Blair Model 622 MJ (4″-20″)
   j. Mueller H300 (Not to be used on Asbestos Cement and Cast Iron Pipe)

3. **(M.J. Steel Sleeve)**

   a. JCM 414 Mechanical Joint

4. **(M.J. Cast/Ductile Iron Sleeve)**

   a. Mueller (H-615 for 4″-24″ on Ductile Pipe and H-619 for 4″-12″ C/A Pipe)

   b. Clow (F-5205)

   c. American Flow Control - (Model 2800-A for A/C pipe; Model 2800-C for 4″-12″ D.I. and PVC pipes; Model 1004 for PVC pipe and 16" and larger D.I. pipe)

   d. U. S. Pipe D.I. T-9 MJ Sleeve

H. Resilient Seated Wedge Tapping Valves

1. American Flow Series 500 Resilient Wedge Valve (for 6″-12″ only)

2. Mueller T-2360 Resilient Wedge Valve (for 6″-12″ only)

3. American Flow Control - Series 2500 (for 16″-30″ only)

4. Kennedy Model #4950 (for 16″ and 20″ only)

5. Clow Model F6114 (for 16″ and 20″ only)

I. Fittings (Bends, Crosses, Tees and Grade Lok Offset Glands) Ductile Iron only

1. D.I. Compact AWWA C153 or D.I./C.I. AWWA C110

2. D.I. Special Coated Compact Fittings AWWA 153

Couplings (For pipe sizes 12″ and smaller)

1. Cast Couplings (transition or straight)

   a. Romac 501 series (long sleeve coupling)

   b. Ford #FC2A (long sleeve coupling)

   c. Smith Blair (Rockwell) #442 (long sleeve coupling)

d. Power Seal Model # 3501 (long barrel coupling)

e. Maxi Fit (long sleeve coupling)

2. Cast D.I. Couplings

a. FEHR

J. Air Release or Combination Air Release and Vacuum Valves
(Engineer is responsible for specifying the appropriate type for its designated use)

1. Clow 5401-E (for 2″ inlet with small orfice)

2. Clow 5402-A (for 1″ inlet and 1″ orfice)

3. APCO (Product Bulletin No. 600 and/or 601)

4. G. A. Industries Type 1 GH4-150 Type 4 GH 7-K

5. Valmatic

6. Cla Val (Models 34, 35 & 36)

K. Blow Off Valves

1. 2″ Bronze Gate Valve
(open to most manufacturers, i.e., Grinell, Epsco, etc.)

L. Line Stopping Valves

1. Hydra-Stop

M. Water Meter Boxes/Vaults

1. Precast Concrete Box:

a. Lyttle Service Co. LLC T/A Stamie E. Lyttle Co., Inc. (used with 1″, 1½″ or 2″ water meters and assemblies)
b. Smith-Midland - Model 550 (for 3″ & 4″ water meters and assemblies)
c. Clear Flow Model CFLD6060 (for 3″ and 4″ water meters and assemblies)
d. M&B – Model #MB1500BF/WM (for 3″ and 4″ water meters and assemblies)

2. Hi-Density Polyethylene Plastic Box (for 5/8″ and 1″ water meters and assemblies only in areas not subject to vehicular traffic):

   a. Mid-States Plastics' meter box (for 5/8″ water meters) # MSBC1015-24-RL with cast iron cover and reader lid
   b. Mid-States Plastics' meter box (for 1″ water meters) # MSIBC1118-26-RL with ductile iron cover and reader lid

3. Cast Iron Box (for 5/8″ water meters and assemblies only in areas subject to vehicular traffic):

   a. Capitol Foundry Design # MBX-10 and MBX-11

N. Valve Boxes (Slip Type Only)

1. SIGMA

2. Bingham and Taylor

3. Capitol Foundry

4. Star Pipe

O. Copper Tubing - (as manufactured for domestic use)

1. Type “K” (soft) - for ¾″ and 1″ service lines

2. Type “K” (hard copper only) - for 1½″ and 2″ service lines

P. Service Saddles

1. ROMAC - Style 202N with Stainless Steel Strap

2. Smith-Blair (Rockwell) SB 317 - (with Double Stainless Steel Straps)

3. Ford FS 202 Series, with cc Threads

4. JCM 404 (with Double Stainless Steel Straps)

5. PowerSeal Model No. 3417 (with double straps)

6. Cascade - Styles CNS2 (for 12″ and smaller pipe), CBS2 (for 12″ and smaller pipe), and CDSLD (large diameter saddles for 16″ and larger pipe)

7. Mueller - Models DB2S & DE2S (with double straps for 2″-12″)

Q. Pipe Restraints (must be UL Listed and FM Approved)

1. For PVC Pipe (Sizes up to 12″)

   a. Megalug Series 2000 PV (PVC Pipe - MJ Fittings)
      Megalug Series 1500 (PVC Bell and Spigot Joints)

   b. Romac Style 611 (PVC Bell and Spigot Joints)

   c. Uni-Flange Series 1390-C (PVC Bell and Spigot Joints)
      Uni-Flange Series 1500 (PVC Pipe - MJ Fittings)

   a. STARGRIP Series 3600 (PVC Pipe - MJ Fittings)

   b. AquaGrip Intergral Restraint System for use on the Centurion Fire Hydrants and Mueller RS Valves

   c. SIGMA One-Lok Model SLC

2. For Ductile Iron Pipe -

   a. Megalug 1100 Series (MJ Fittings) All Sizes

   b. Uni-Flange Series 1400 Block Buster Wedge Action Retainer Glands (MJ Fittings) Sizes 4″-24″

   c. Uni-Flange Series 1390-C (Bell and Spigot Joints) Sizes 6″–16″

   d. STARGRIP Series 3000 (MJ Fittings) Sizes 4″-24″
      STARGRIP Series 3600 (MJ Fittings) Sizes 4″-12″

   e. RomaGrip Sizes 4″–12″

   f. SIGMA One-Lok Model SLD (MJ Fittings) Sizes 4″–36″

R. Markers

1. For All Types of Pipes

   a. 66″ Carsonite White Utility Marker Post with two (2) factory applied decals (#CW-112 or #CWV-116, whichever is applicable; and Stock #P-101 decal)

   b. Greenline Markers - Model #'s FLUlWH66 and DSUlWH66 with factory applied decals 159A, 029A or 094A, whichever is applicable in Chesterfield County.

S. Flushing Hydrants

1. Gil Industries 2″ Aquarius “One-O-One” HH (Chesterfield Type)

2. Kupferle 2″ Main Guard Model #78 (Chesterfield Type)

T. Double Check and Double Detector Check Devices (U.L. classified or F.M. Approved, AWWA compliant and ASSE listed 1015 for DC’s and 1048 for DDC’s)

Manufacturer	Model #'s	Size
Ames Co., Inc.	2000SS	4″ - 10″
	2000DCA	4″ - 8″
	2000SE	8″
	3000SS	4″ - 10″
	3000DCDA	4″ - 10″
	3000SE	8″
	200A Colt Series	2½″ - 10″
	300A Colt Series	2½″ - 10″
Cla-val Co.	D	2″ - 10″
	16DDC	3″ - 10″
Conbraco Industries, Inc.	40-10A	4″
	4060A02	4″
	4060C02	6″
	40-l0C	6″
	4010E02	8″
	4010G02	10″
	4S100	2½″ - 6″
	40100	2½″ - 10″

Febco	805 YD	3″ - 10″
	806 YD	3″ - 10″
	850	2½″ - 8″
	856	2½″ - 8″
	870 (V)	2½″ - 10″
	876 (V)	2½″ - 10″
Hersey Products	DDC11	3″ - 10″
	No. 2	3″ - 10″
	FDC	¾″ - 2″
	HDC	¾″ - 2″
Watts Regulator Co.	700	3″ - 4″
	709	3″ - 10″
	709DCDA	3″ - 10″
	770DCA	4″ - 10″
	770DCDA	4″ - 10″
	007	½″ - 3″
	007DCDA	2″ - 3″
Zurn Industries, Inc. (Wilkins)	550	3″ - 6″
	MX-550	6″ - 10″
	MX-DCDA	6″ - 10″
	350	2½″ - 6″
	350DA	4″ - 6″
	450	4″ - 6″
	450DA	4″ - 6″
	950	2½″ - 10″
	950 LF	¾″ - 4″
	950 DA	2½″ - 10″
	950 XL	¾″ - 2″

U. Reduced-Pressure Principle Zone Devices (U.L. classified or F.M. approved, AWWA compliant and ASSE listed 1013)

Manufacturer	Model #'s	Size
Ames	4000 RP	4″ - 10″
	4000 SS	3″ - 10″
Cla-val Co.	RP-2	¾″ - 1½″

Conbraco Industries, Inc.	40-200		3″
	40-20A		4″
	40-20C		6″
	4020E02		8″
	4020G02		10″
	40200	2½″ -	10″
Febco	6C-M	3″ -	10″
	FRPII	¾″ -	1½″
	825 D & YD	3″ -	10″
	860	2½″ -	8″
	880 (V)	2½″ -	10″
Hershey Products, Inc.	6	4″ -	10″
	6C	4″ -	10″
Watts Regulator Co.	900	3″ -	6″
	909	3″ -	10″
	009RP		3″
Zurn Industries, Inc. (Wilkins)	375	2½″ -	6″
	375DA	4″ -	6″
	475	4″ -	6″
	475V	4″ -	6″
	975	2½″ -	10″
	975DA	2½″ -	10″

V. Casing Spacers

1. Cascade

2. Advance — Model SSI

3. PSI — Model No. C8G-2
   Model No. C12G-2

4. Power Seal — Model No. 4810

W. Lubricants

1. Blue Lube

2. Slikstyx (new product formulation only)

X. Water Sampling Stations

1. GIL # EH101

Y. Valve Key Extensions

1. Chesterfield Model (See Detail in Part II of this manual)

SECTION 2: SANITARY SEWER SYSTEM

A. Pipes

1. Concrete

   a. Circular Reinforced (ASTM C76)

2. PVC Sanitary Sewer Pipe SDR35 (ASTM D3034 6″ - 15″)

3. PVC Sanitary Sewer Pipe Envrio-Tite SDR 35 (ASTM F1760 6″-15″)

4. PVC Sanitary Sewer Pipe SDR 35 (ASTM F679, 18″-48″), T1 Wall Thickness

5. Perma Loc (21″-36″) Series 46 with minimum wall thickness of 17″

6. Ultra Rib (21″-36") with minimum wall thickness of .17″

7. Ductile Iron Pipe Class 52 Minimum or higher classification depending upon design consideration. (Push-On and Mechanical Joint) (6″, 8″,10″, 12″, 16", 20″, 24″, 30″ & 36″)

8. Carlon Vylon H.C. - a.k.a. Lamson Pipe (21″-48″) with minimum wall thickness of .17"

9. Ultra-Corr PVC Pipe (24″-36″) with minimum wall thickness of .17″

B. Manholes, Precast Concrete (ASTM C478)

1. Hanson Pipe & Products

2. Americast

3. Concrete Specialties, Inc.

C. Frames and Covers

1. Manhole

a. Street Type (MH-1-S)

1) Neenah Foundry
2) Capitol Foundry
3) Sigma Corporation
4) East Jordan Iron Works
5) FasTech

b. Watertight

1) Capitol MH 1-S/WT
2) East Jordan Iron Works
3) FasTech

D. Fittings (Gasketed)

1. Concrete

a. Circular Reinforced (ASTM C76)

1) Hanson Pipe & Products

b. Kor-N-Tee

c. Inserta Tee

2. PVC Sanitary Sewer Fittings (ASTM D3034 SDR35 6″ - 27″)

a. Certain-Teed Products Corporation

b. J-M Manufacturing Co.

c. The Harrington Corporation (HARCO)

d. GPK Products, Inc.

e. Vassallo

f. Multi-Fittings

g. Scepter-Canron, Inc. (IPEX)

h. Plastic Trends, Inc.

i. Nyloplast USA, Inc.

j. Freedom Plastics, Inc.

E. Adaptors

1. Fernco Pipe Adaptors - (Used only when installing 6” connections where 6” connection is of Ductile Iron material)

2. GPK Manhole Adaptors (See MAN-16)

   a. GPK manhole adaptor adapting PVC pipe to concrete with quick quete for manholes with BUO's.

   b. GPK PVC drop manhole cross with manhole adaptors (6” and 8” only) strapped to manhole.

3. DFW/HPI Nonshear Coupling (Used only at the direction of the County Inspector where pipe transitioning is necessary due to unlike pipe materials.)

F. Gaskets & Flexible Manhole Connectors

1. Kor-n-seal Connector, NPC Systems, Inc.

2. “O” Ring Gasket

3. Flat Gasket for Watertight Manholes

4. Press-Boot Connector, Press-Seal Gasket Corp.

5. Profile RS or Type 4G Gaskets, Press-Seal Gasket Corp.

6. IPS Adjustable, Cobra, or Toggle styles

G. Saddles

1. The General Engineering Company (GENECO) Sealtite Model H with Bell End for SDR-35 PVC

2. ROMAC CB Sewer Saddle

3. Inserta Tee

H. Steps, Manhole

1. MA Industries, Inc.
   Style No. PSl-PF

2. Bowco Industries, Inc.
   Model #93810 (48″ and 54″ Dia. M.H.'s)
   Model #93813 (60″ Dia. M.H.'s and Larger)

3. Press Seal
   Model #P-10938 (48″ and 54″ Dia. M.H.'s)
   Model #P-14850 (60″ Dia. M.H.'s and Larger)

4. Cosmos North America
   Model #US-10-OH

5. American Step Company
   Model #ML-10 (Standard Grade)

I. Stoppers (Plugs)

1. For PVC Sanitary Sewer Pipe (with wing nuts and ears)

   a. Certain-Teed Products Corporation

   b. Cherne

2. For D.I. Pipe (Slip Joint Plug)

   a. Griffin Pipe Products

   b. Tyler

   c. Union Foundry

   d. Harrington Corporation (HARCO)

   e. Standard International

f. Trinity Valley

g. American Cast Iron

h. U. S. Pipe and Foundry

i. Cherne

J. Valves

1. Sewage Air/Vacuum Release Valves

   a. Vent-O-Mat Series RGX or RGS_b – “Anti-Surge” (Note: Engineer must design project using the appropriate valve.)

2. Plug Valves

   a. DeZurik Series 100 [Figure 118] - (Non-Lubricated Eccentric)

   b. Val-Matic Series 5900 or 5800 Cam-Centric

   c. Milliken - Millcentric (Eccentric Plug Valve)

   d. Homestead Eccentric Plug Valve - Series 120

   e. Clow Eccentric Plug Valve (3”-24”)

K. Manhole Adjusting Rings

1. Concrete Reinforced

2. LadTech H.D.P.E.

SECTION 3: MANUFACTURER'S ADDRESS LIST

A. WATER SYSTEMS

PVC PIPE 6”, 8” and 12”

MANUFACTURERS:

C-900	1.	Certainteed Corporation P.O. Box 860 Valley Forge, PA 19482	(610) 341-7000 FAX (610) 341-6837
C-900 or C-909	2.	PW Eagle, Inc. (formerly Uponor ETI Company) P.O. Box 709 Buckhannon, WV 26201	(800) 624-3111 FAX (304) 472-0742
C-900	3.	J-M Manufacturing Co., Inc. 9 Peach Tree Hill Road Livingston, NJ 07039	(201) 535-1633
C-900	4.	IPEX, Inc. (frmly Scepter-Canron) 2441 Royal Windsor Drive Mississauga, Ontario Canada L5J4C7	(800) 463-9572 FAX (905) 403-9195
C-900	5.	Diamond Plastics Corporation 1212 Johnstown Road P.O. Box 1608 Grand Island, NE 68802	(308) 384-4400 FAX (308) 384-9345
C-900	6.	North American Pipe Corporation 200 Park Place Booneville, MS 38829	(601) 728-2111 FAX (601) 728-3135
C-900	7.	National Pipe & Plastics, Inc. 9609 Old Highway 421S Colfax, N.C. 27235	(800) 866-0149 FAX (336) 996-1755
C-900	8.	Bristolpipe A Heywood Williams Company 601 County Road 17 P.O. Box 1868 Elkhart, IN 46515	(800) 348-7671 (219) 295-4515 FAX (800) 272-7044

DUCTILE IRON PIPE

MANUFACTURERS:

1. Griffin Pipe Products (804) 845-8021
   Box 740
   Lynchburg, VA 24505

2. Atlantic States Cast Iron Pipe Co. (908) 454-1161
   183 Sitgreaves FAX (908) 454-1026
   Phillipsburg, NJ 08865-3052

3. American Ductile Iron Pipe
   (MANUFACTURES PUSH-ON & RESTRAINED JOINT PIPES)
   A Division of American Cast Iron Pipe Co. (412) 851-1230
   2581 Washington Road FAX (412) 851-1243
   Suite 220 & 222
   Pittsburgh PA 15241

4. U.S. Pipe & Foundry Company (410) 879-3556
   1212 Churchville Road, Suite 101 FAX (410) 879-0873
   Bel Air, MD 21014

PRESTRESSED CONCRETE PRESSURE PIPE

MANUFACTURERS:

1. Price Brothers Company (513) 226-8700
   367 W. Second St., P.O. Box 825
   Dayton, OH 45402

MECHANICAL JOINT FITTINGS

MANUFACTURERS: (Ductile Iron Compact or Non Compact Fittings)

1. Griffin Pipe Products (804) 845-8021
   Box 740
   Lynchburg, VA 24505

2. Tyler Pipe & Foundry Utilities (214) 882-5511
   P.O. Box 2027
   Tyler, TX 75710

3. Union Foundry (800) 633-2442
   P.O. Box 309
   Anniston, AL 36202

4. The Harrington Corporation (HARCO) (804) 845-7094
   P.O. Box 10335
   Lynchburg, VA 24506

5. U.S. Pipe & Foundry Company (410) 879-3556
   1212 Churchville Road, Suite 101 FAX (410) 879-0873
   Bel Air, MD 21014

6. SIGMA Corporation (609) 758-0800
   700 Goldman Drive, P. O. Box 300 (800) 999-2550
   Cream Ridge, NJ 08514 FAX (609) 758-1158

7. Star Pipe Products, Inc. (713) 558-3000
   4018 Westhollow Parkway (800) 999-3009
   Houston, TX 77082 FAX (713) 558-9000

8. Fastner Technologies, Inc. (FASTECH) (904) 474-0211
   3301 Bill Metzger Lane FAX(904) 474-0277
   P.O. Box 15270
   Pensacola, FL 32514

MANUFACTURERS (D.I. Special Coated Compact Fittings):

1. U.S. Pipe and Foundry Company (205) 254-7442
   P.O. Box 10406 FAX (205) 754-7494
   Birmingham, AL 35202

COUPLINGS

MANUFACTURERS:

1. ROMAC Industries, Inc. (800) 426-9341
   1064 4th Avenue S.
   Seattle, WA 98134

2. Ford Meter Box Company, Inc. (219) 563-3171
   775 Manchester Avenue FAX (800) 826-3487
   P.O. Box 443
   Wabash, IN 46992-0443

3. Smith-Blair,Inc., A BTR Company (800) 643-9705
   P.O. Box 5337
   Texarkana,TX 75505

4. Power Seal Pipeline Products Corp. (817) 767-5566
P.O. Box 2014 (800) 800-0932
Wichita Falls, TX 76307 FAX (817) 732-8378

5. Viking Johnson Tel: (01462)422622
46-48 Wilbury Way FAX: (01462)422072
Hitchin, Hertfordshire SG4 OUD, U.K.
International Tel: +44 1462 422622
International FAX: +44 1462 422072
E-mail: info@vikingjohnson.co.uk
WWW:http://www.vikingjohnson.co.uk

OFFSET GLANDS

MANUFACTURERS

1. Assured Flow Sales, Inc. (813) 377-4563
P.O. Box 49633 (800) 388-0678
Sarasota, FL 34230-6633 FAX (813) 377-4049

RESILIENT SEATED GATE VALVES AND FIRE HYDRANTS

MANUFACTURERS:

1. Mueller Company (217) 320-6278
500 West Eldorado Street
P.O. Box 671
Decatur, IL 62525

2. Kennedy Valve Company, (607) 734-2211
A Division of McWane FAX (607) 734-3288
1021 East Water Street
Elmira, NY 14901

3. Clow Valve Company (800) 247-CLOW
P.O. Box 350
Oskaloosa, IA 52577

4. M & H Valve Company, (205) 237-3521
A Division of McWane, Inc. FAX (205) 237-8630
P.O. Box 2088
Anniston, AL 36202

5. American Flow Control, (205) 325-7856
(Formerly American Darling)
2930 N. 16th. Street
P.O. Box 2727
Birmingham, AL 35202-2727

6. U.S. Pipe & Foundry Co. (205) 254-7215
Valve & Hydrant Products
P.O. Box 10406
Birmingham, AL 35202

BUTTERFLY VALVES

MANUFACTURERS:

1. Mueller Company (804) 320-6278
500 West Eldorada Street
P.O. Box 671
Decatur, IL 62525

2. American Flow Control (205) 325-7856
2930 N. 16th. Street
P.O. Box 2727
Birmingham, AL 35202-2727

American Flow Control (770) 730-9925
6900 Roswell Road Apt. P-4 FAX (770) 730-9985
Atlanta, GA 30362-0700

3. DeZurik (612) 259-2000
250 Riverside Ave. North
Sartell, MN 56377

4. Henry Pratt Company (708) 844-4000
401 South Highland Avenue FAX (708) 844-4124
Aurora, IL 60506-5593

5. M & H Valve Company, (205) 237-3521
A Division of McWane, Inc. FAX (205) 237-8630
P.O. Box 2088
Anniston, AL 36202

6. Rodney Hunt Company (508) 544-2511
Orange, MA 01364 FAX (508) 544-7204

7. CMB Industries, Inc. (559) 252-0791
A United Dominion Company FAX (559) 453-9030
P. O. Box 8070
Fresno, CA 93747-8070

TAPPING SLEEVES

MANUFACTURERS (Fabricated Steel and Stainless Steel Sleeves):

1. JCM Industries, Inc. (800) 527-8482
P.O. Box 580
Nash, TX 75569

2. Smith-Blair, Inc. (501) 773-5127
P.O. Box 5337 (800) 643-9705
Texarkana, TX 75505 FAX (800) 648-6792

3. ROMAC Industries, Inc. (800) 426-9341
1064 4th Avenue S.
Seattle, WA 98134

4. Power Seal Pipeline Products Corp. (817) 767-5566
P.O. Box 2014 (800) 800-0932
Wichita Falls, TX 76307 (205) 237-3521

5. The Ford Meter Box Company, Inc. (219) 563-3171
775 Manchester Avenue FAX (800) 826-3487
P.O. Box 443
Wabash, IN 46992-0443

6. Cascade Waterworks Manufacturing, Inc. (312) 553-0840
1213 Badger (800) 426-4301
Yorkville, IL 60560 FAX (312) 553-0181

7. Mueller Company (804) 320-6278
500 West Eldorado Street, P.O. Box 671
Decatur, IL 62525

8. Dresser Industries, Inc., DMV Division (814) 362-9200
410 Fisher Avenue FAX (814) 362-9333
Bradford,PA 16701

MANUFACTURERS (Mechanical Joint Cast/Ductile Iron and Steel Sleeves)

1. Mueller Company (804) 320-6278
   500 West Eldorado Street, P.O. Box 671
   Decatur, IL 62525

2. Clow Valve Company (800) 247-CLOW
   P.O. Box 350
   Oskaloosa, IA 52577

3. JCM Industries (800) 527-8482
   P.O. Box 580
   Nash, TX 75569

4. American Flow Control (205) 325-7856
   (Formerly American-Darling)
   2930 N. 16th. Street, P.O. Box 2727
   Birmingham, AL 35202-2727

5. U.S. Pipe & Foundry Company (423) 752-3700
   Box 6159 FAX (423) 752-3710
   Chattanooga, TN 37401

TAPPING VALVES

MANUFACTURERS:

1. Mueller Company (804) 320-6278
   500 West Eldorado Street, P.O. Box 671
   Decatur, IL 62525

2. Clow Valve Company (800) 247-CLOW
   P.O. Box 350
   Oskaloosa, IA 52577

3. Kennedy Valve Company, A Div.of McWane (607) 734-2211
   1021 East Water Street FAX (607) 734-3288
   Elmira, NY 14901

4. American Flow Control (205) 325-7856
   (Formerly American-Darling)
   P.O. Box 2727
   Birmingham, AL 35202-2727

		American Flow Control	(770) 730-9925
		6900 Roswell Road Apt. P-4	FAX (770) 730-9985
		Atlanta, GA 30362-0700	

LINE STOPPING VALVES

MANUFACTURERS:

	1.	Hydra-Stop Inc.	(800) 538-5111
		12601 South Homan Avenue	
		Blue Island, IL 60406	

SERVICE MATERIAL

MANUFACTURERS:

METER YOKES (MY), CORPORATION STOPS (CS), COMPRESSION FITTINGS (CF), CURB STOPS (CBS), (See Part V, Section 1 for approved Model #'s)

MY,CS,CF, CBS	1.	Mueller Company	(217) 320-6278
		500 West Eldorado Street	
		Decatur, IL 62525	
MY,CS,CF, CBS	2.	Ford Meter Box Co., Inc.	(219) 563-3171
		775 Manchester Ave. P.O. Box 443	
		Wabash, IN 46992	
		Ford Meter Box Co., Inc.	(804) 747-9955
		c/o Loyal Butts	
		1695 Brackets Bend Road	
		Powhatan, VA 23139	
MY,CS, CF,CBS	3.	A. Y. McDonald Manufacturing Co.	(319) 583-7311
		P.O. Box 508 4800 Chavenelle Road	or
		Dubuque, IA 52001	(800) 292-2737
CS	4.	James Jones Company	(818) 443-6191
		4127 Temple City Boulevard	
		E1 Monte, CA 91734	
CBS,CS, CF,MY	5.	Cambridge Brass	(519) 621-5520
		P.O. Box 249, 140 Orion Place	FAX (519) 621-8038
		Cambridge, Ontario NIR-5V1	

COPPER TUBING

MANUFACTURERS:

	1.	Wolverine Tube P.O. Box 2202 Decatur, AL 35602	(205) 353-1310
	2.	CERRO Copper Products P.O. Box 91849 Chicago, IL 60693	(618) 337-6000
	3.	Cambridge Lee Industries P.O. Box 81349 Atlanta, GA 30366	(800) 241-3255
	4.	Mueller Brass Company 1925 Lapeer Avenue Port Huron, MI 48060	(313) 987-4000 FAX (313) 987-6946

VAULTS AND/OR METER BOXES [for 1 1/2" **and larger water meters and assemblies** (WM) **and for backflow devices (BF)] - PRECAST CONCRETE**

MANUFACTURERS:

WM (1"-2")	1.	Lyttle Service Co., LLC T/A Stamie E. Lyttle Company 2210 Belt Blvd., P.O. Box 24205 Richmond, VA 23224	(804) 231-3426
WM, BF	2.	Americast, A Division of Valley Blox, Inc. P.O. Box 432, 210 Stone Spring Road Harrisonburg, VA 22801	(800) 548-4586
		Americast, A Division of Valley Blox, Inc. 11352 Virginia Precast Road Ashland, VA 23005	(804) 798-6068
BF	3.	Elite Fire Protection,Inc. 10926 Bush Lake Lane Glen Allen, VA 23060	(804) 270-1951 FAX (804) 273-9871

BF	4.	Tindall Concrete Products, Inc.	(800) 849-4521
		3076 N. Blackstock Rd., P.O. Box 1778	(864) 576-3230
		Spartanburg, SC 29304	FAX (864) 587-8828
WM (3″&4″)	5.	Smith-Midland Corporation	(540) 439-3266
		P.O. Box 300	FAX (540) 439-1232
		Midland, VA 22728	
BF	6.	The Clear Flow Company	(540) 949-8386
		P.O. Box 1467,1321 N. Delphine Ave	FAX (540) 885-3280
		Waynesboro, VA 22980	
BF	7.	Rotondo Precast	(540) 898-6300
		A Division of Old Castle Precast	FAX (540) 898-2389
		5515 Massaponax Church Road	
		Fredericksburg, VA 22407	
WM (3″&4″) BF	8.	M&B Concrete Products Inc.	(804) 748-5557
		P.O. Box 2250	FAX (804) 748-5557
		Chester, VA 23832	

METER BOXES (for 5/8" and 1" water meters)

MANUFACTURERS:

POLYETHYLENE

1.	Mid-States Plastics, Inc.	(800) 444-7615
	280 Midland Trail	(606) 498-7615
	Mt. Sterling, KY 40353	FAX (606) 498-7919

CAST IRON

1.	Capitol Foundry of Virginia, Inc.	(804) 427-9431
	2856 Crusader Circle Mailing Address: P.O. Box 2212	
	Virginia Beach, VA 23456 Va. Beach,VA 23452	

SERVICE SADDLES

MANUFACTURERS:

1.	ROMAC Industries, Inc.	(800) 426-9341
	1064 4th Avenue S.	
	Seattle, WA 98134	

2. Smith-Blair,Inc. (800) 643-9705
A BTR Company
P.O. Box 5337
Texarkana,TX 75505

3. Ford Meter Box Company (219) 563-3171
775 Manchester Avenue
P.O. Box 443
Wabash, IN 46992

4. JCM Industries, Inc. (800) 527-8482
P.O. Box 580
Nash, TX 75569

5. Power Seal Pipeline Products Corp. (817) 767-5566
P.O. Box 2014 (800) 800-0932
Wichita Falls, TX 76307 FAX (817) 732-8378

6. Cascade Waterworks (312) 553-0840
Manufacturing, Inc. (800) 426-4301
1213 Badger FAX (312) 553-0181
Yorkville,IL 60560

7. Mueller Company (217) 320-6278
500 West Eldorado Street
Decatur, IL 62525

AIR RELEASE VALVES

MANUFACTURERS:

1. APCO Valve & Primer Corporation (708) 529-9000
1420 S. Wright Blvd. FAX (708) 529-9007
Schaumburg, IL 60193-4599

2. G.A. Industries (412) 625-3541
9025 Marshall Road
Mars, PA 16046

3. Cla-Valve Company (301) 652-9244
7720 Wisconsin Ave., Suite 226
Bethesda, MD 20814

4. Clow Special Products Division (817) 767-5566
P.O. Box 2014
Wichita Falls, TX 76307

5. Val-Matic Valve & Manufacturing Corp.
   905 Riverside Drive
   Elmhurst, IL 60126
   (708) 941-7600
   Telex 28-1001
   FAX (708) 941-8042

VALVE BOXES

MANUFACTURERS:

1. SIGMA Corporation
   700 Goldman Drive, P. O. Box 300
   Cream Ridge, NJ 08514
   (609) 758-0800
   (800) 999-2550
   FAX (609) 758-1158

2. Bingham and Taylor
   P.O. Box 552
   Culpepper, VA 22701

3. Capitol Foundry of Virginia, Inc.
   2856 Crusader Circle
   Virginia Beach, VA 23456
   (804) 427-9431
   Mailing Address:
   P.O. Box 2212
   Va. Beach,VA 23452

4. Star Pipe Products, Inc.
   4018 Westhollow Parkway
   Houston, TX 77082
   (713) 558-3000
   (800) 999-3009
   FAX (713) 558-9000

RESTRAINERS

MANUFACTURERS:

1. EBAA Iron, Inc. (Megalug)
   P.O. Box 857
   Eastland, TX 76448
   (817) 629-1737

2. Romac Industries, Inc.
   1064 4th Avenue S.
   Seattle, WA 98134
   (800) 426-9341

3. Uni-Flange
   5285 Ramona Boulevard
   Jacksonville, FL 32205
   (800) 786-3628
   FAX (904) 781-3835

4. Star Pipe Products, Inc.
   4018 Westhollow Parkway
   Houston, TX 77082
   (713) 558-3000
   (800) 999-3009
   FAX (713) 558-9000

5. SIGMA Corporation (609) 758-0800
700 Goldman Drive, P. O. Box 300 (800) 999-2550
Cream Ridge, NJ 08514 FAX (609) 758-1158

6. Mueller Co.
Main Office – Decatur, IL
Water Division (800) 423-1323
Canada – Mueller Canada Inc. (905) 878-0541
E-mail: moreinfo@muellercompany.com
www.muellercompany.com

MARKERS

MANUFACTURERS:

1. Carsonite International (702) 883-5104
2900 Lockheed Way (800) 648-7974
Carson City, NV 89701

2. Greenline (800) 438-4733
1616 Commerce Drive FAX (800) 232-9872
Stowe, OH 44224-1731

FLUSHING HYDRANTS

MANUFACTURERS:

1. GIL Industries, Inc. (904) 434-3912
P.O. Box 3501
Pensacola, FL 32505

2. The Kupferle Foundry Company (314) 231-8738
813 Hemstead Place (800) 231-3990
St. Louis, MO 63102 FAX (314) 231-2820

CASING SPACERS

MANUFACTURERS:

1. Cascade Waterworks Manufacturing, Inc. (312) 553-0840
1213 Badger (800) 426-4301
Yorkville, IL 60560 FAX (312) 553-0181

2. Advance Products & Systems, Inc. (318) 233-6116
P.O. Box 53096 FAX (318) 232-3860
Lafayette, LA 70505-3096

3. PSI Pipeline Seal and Insulator, Inc. (713) 747-6948
6525 Goforth Street FAX (713) 747-6029
Houston, TX 77021

4. Power Seal Pipeline Products Corp. (817) 767-5566
P.O. Box 2014 (800) 800-0932
Wichita Falls, TX 76307 FAX (817) 732-8378

LUBRICANTS

MANUFACTURERS:

1. J. C. Whitlam Manufacturing Company (800) 321-8358
200 West Walnut Street (330) 334-2524
P.O. Box 380 FAX (800) 537-0588
Wadsworth, Ohio 44282-0380 FAX (330) 334-3005

2. Future Tools, Inc. (740) 927-7712
13591 Cable Road FAX (740) 927-9929
Pataskala, Ohio 43062

WATER SAMPLING STATIONS

MANUFACTURERS:

1. GIL Industries, Inc. (904) 434-3912
P.O. Box 3501
Pensacola, FL 32505

VALVE KEY EXTENSIONS

MANUFACTURERS:

1. West End Machine and Welding, Inc. (804) 266-9631
6804 School Avenue FAX (804) 264-0747
P.O. Box 9444
Richmond, VA 23228
Attn: Dan Heath

B. SANITARY SEWER SYSTEMS

PIPE: PVC SDR-35 (SIZES 6", 8", 10" 12" AND 15") ASTM D3034 SDR 35

MANUFACTURERS:

ASTM D3034	1.	Certainteed Corporation P.O. Box 860 Valley Forge, PA 19482	(610) 341-7000 FAX (610) 341-6837
ASTM D3034	2.	PW Eagle, Inc. (formerly Uponor ETI Company) P.O. Box 709 Buckhannon, WV 26201	(800) 624-3111 FAX (304) 472-0742
ASTM D3034	3.	J-M Manufacturing Co., Inc. (J.M.) 9 Peach Tree Hill Road Livingston, NJ 07039	(201) 535-1633
ASTM D3034 ASTM F1760	4.	IPEX, Inc. (frmly Scepter-Canron) 2441 Royal Windsor Drive Mississauga, Ontario, Canada L5J4C7	(800) 463-9572 FAX (905) 401-9195
ASTM D3034	5.	Diamond Plastics Corporation 1212 Johnstown Road P.O. Box 1608 Grand Island, NE 68802	(308) 384-4400 FAX (308) 384-9345
ASTM D3034	6.	North American Pipe Corporation (NAPCo) 200 Park Place Booneville, MS 38829	(601) 728-2111 FAX (601) 728-3135
ASTM D3034	7.	Bristolpipe A Heywood Williams Company 601 County Road 17 P.O. Box 1868 Elkhart, IN 46515	(800) 348-7671 (219) 295-4515 FAX (800) 272-7044
ASTM D3034	8.	National Pipe & Plastics, Inc. 9609 Old Highway 421S Colfax, N. C. 27235	(800) 866-0149 FAX (336) 996-1755

PIPE: PVC SDR-35 (Sizes 18"-48") ASTM F679

MANUFACTURERS:

1. Certainteed Corporation (610) 341-7000
   P.O. Box 860 FAX (610) 341-6837
   Valley Forge, PA 19482

2. Condux Pipe Systems (507) 387-2284
   P.O. Box 789
   Mankato, MN 56002

3. J-M Manufacturing Co., Inc. (201) 535-1633
   9 Peach Tree Hill Road
   Livingston, NJ 07039

4. North American Pipe Corp. (601) 728-2111
   200 Park Place FAX (601) 728-3135
   Booneville, MS 38829

5. National Pipe & Plastics, Inc. (800) 866-0149
   9609 Old Highway 421S FAX (336) 996-1755
   Colfax, N. C. 27235

PIPE: ULTRA-RIB PVC (21"-36") ASTM F794

MANUFACTURERS:

1. PW Eagle, Inc. (800) 624-3111
   (formerly Uponor ETI Company) FAX (304) 472-0742
   P.O. Box 709
   Buckhannon, WV 26201

PIPE: PERMA-LOC, PVC (21"-36") ASTM F794 Series 46

MANUFACTURERS:

1. J-M Manufacturing Co., Inc. (201) 535-1633
   9 Peach Tree Hill Road
   Livingston, NJ 07039

PIPE: CARLON VYLON H.C. (21"-48") ASTM F794

MANUFACTURERS:

1. Carlon, A Lamson & Sessions Company (216) 831-4000
   25701 Science Park Drive (800) 321-1970
   Cleveland, OH 44122 FAX (216) 831-3208

PIPE: ULTRA-CORR (24"-36") ASTM F794

MANUFACTURERS:

1. PW Eagle, Inc. (800) 624-3111
   (formerly Uponor ETI Company) FAX (304) 472-0742
   P.O. Box 709
   Buckhannon, WV 26201

PIPE: CONCRETE

MANUFACTURERS:

1. Hanson Pipe & Products, Inc. (800) 309-1202
   2900 Terminal Avenue (804) 233-5471
   Richmond, VA 23234-1632 FAX (804) 232-1213

2. Hydro Conduit Corporation (919) 475-1371
   208 Randolph Street, P.O. Box 818
   Thomasville, N.C. 27360-0818

FITTINGS: PVC SDR-35 gasketed sewer fittings

MANUFACTURERS:

1. Head Manufacturing, Inc. (208) 852-2000
   640 South Highway 91 FAX (208) 852-2003
   Preston, ID 83263-9738
   (Formerly Certainteed Corp. Fittings)

2. J-M Manufacturing Co., Inc. (201) 535-1633
   9 Peach Tree Hill Road
   Livingston, NJ 07039

3. Vassallo, Inc. (813) 676-7975
   P.O. Box 567 (800) 237-6215
   State Route 60 West FAX (813) 676-0216
   Lake Wales, FL 33853

4. The Harrington Corporation (HARCO) (804) 845-7094
   P.O. Box 10335
   Lynchburg, VA 24506

5. Multi-Fittings, Inc. (800) 344-5819
   731 Langco, Suite 101
   Richardson, TX 75281

7. GPK Products, Inc. (800) 437-4670
1601 43rd. Street NW FAX (800) 822-6989
Fargo, ND 58102

8. Plastic Trends, Inc. (216) 825-4053
3718 Golf Course Drive FAX (216) 825-7357
Norton, OH 44203

9. Nyloplast USA, Inc. (404) 932-2443
3130 Verona Avenue FAX (404) 932-2490
Buford, GA 30518

10. Freedom Plastics, Inc. (608) 754-2710
P.O. Box 1488
Janesville, WI 53547

FITTINGS: CONCRETE

MANUFACTURERS:

1. Hanson Pipe & Products, Inc. (800) 309-1202
2900 Terminal Avenue (804) 233-5471
Richmond, VA 23234-1632 FAX (804) 232-1213

MANHOLE RISERS (R), CONES (C) and ADJUSTING RINGS (AR)

MANUFACTURERS:

R,C,AR 1. Hanson Pipe & Products, Inc. (800) 309-1202
2900 Terminal Avenue (804) 233-5471
Richmond, VA 23234-1632 FAX (804) 232-1213

R,C,AR 2. Americast,
A Division of Valley Blox, Inc. (800) 548-4586
P.O. Box 432
210 Stone Spring Road
Harrisonburg, VA 22801

Americast,
A Division of Valley Blox, Inc. (804) 798-6068
11352 Virginia Precast Road
Ashland, VA 23005

R,C,AR 3. Concrete Specialties, Inc. (703) 982-0777
1420 16th. Street N.E. FAX (703) 982-0775
Roanoke, VA 24014

AR 4. LADTECH, Inc. (651) 415-1252
244 Woodbridge Lane FAX (651) 415-1090
Lino Lakes, MN 55014

MANHOLE FRAMES AND COVERS

MANUFACTURERS:

1. Capitol Foundry (804) 427-9431
2856 Crusader Circle
Virginia Beach, VA

2. Neenah Foundry (414) 725-7000
P.O. Box 729 FAX (414) 729-3682
Neenah, WI 54959

3. SIGMA Corporation (609) 758-0800
700 Goldman Drive, P. O. Box 300 (800) 999-2550
Cream Ridge, NJ 08514 FAX (609) 758-1158

4. East Jordan Iron Works, Inc. (800) 418-3549
P.O. Box 245
Finksburg, MD 21048

5. FasTech Fastener Technology, Inc. (904) 474-0211
P.O. Box 13011 FAX (904) 474-0277
Pensacola, FL 32501

MISCELLANEOUS ITEMS

MANUFACTURERS:

ADAPTORS

1. GENECO (The General Engineering Co.) (301) 663-9282
Box 609 (800) 345-6454
Frederick, MD 21701 FAX (301) 695-5612

2. GPK Products, Inc. (800) 437-4670
1601 43rd. Street NW FAX (800) 822-6989
Fargo, ND 58102

3. DFW/HPI (800) 255-7633
P.O. Box 648 FAX (817) 488-4412
Bedford, TX 76095

6" OR 8" PLASTIC END PLUGS (WITH WING NUT AND EARS)

1. Certainteed Corporation (215) 341-7000
P.O. Box 860
Valley Forge, PA 19482

2. Cherne Industries, Inc. (800) 843-7584
5701 South County Road 18 (612) 933-5501
Minneapolis, MN 55436 FAX (612) 938-6601

GASKETS (G) and Flexible Manhole Connectors (FMC)

(FMC) 1. NPC Systems, Inc. (603) 673-8680
Elm Street, Box 301
Milford, NH 03055

(G) (FMC) 2. Press-Seal Gasket Corporation (800) 348-7325
P.O. Box 10482 FAX (219) 436-1908
Fort Wayne, IN 46852

(G) 3. Fowler Manufacturing Company (503) 357-2110
P.O. Box 767
Hillsboro, OR 97123

(FMC) 4. International Precast Supply (800) 845-3537
60 Railroad Street FAX (978) 372-2831
Haverhill, MA 01835

SEWER SADDLES with approved gaskets

1. ROMAC Industries, Inc. (800) 426-9341
1064 4th. Avenue S.
Seattle, WA 98134

2. GENECO (The General Engineering Co.) (301) 663-9282
Box 609 (800) 345-6454
Frederick, MD 21701 FAX (301) 695-5612

3. INSERTA Fittings Company (503) 357-2110
P.O. Box 767 FAX (503) 359-5417
Hillsboro, OR 97123

AIR/VAC AND COMBINATION VALVES

1. Mulric Hydro Projects (027 11 International)748-0287
   (VENT-O-MAT) FAX (027 11 International)422-3078
   P.O. Box 16091
   Atlasville, 1465 South Africa

PLUG VALVES

1. Dezurik (612) 259-2000
   250 Riverside Avenue North
   Sartell, MN 56377

2. Val-Matic Valve and Manufacturing Corp. (708) 941-7600
   905 Riverside Drive FAX (708) 941-8042
   Elmhurst, IL 60126

3. Milliken Valve Company, Inc. (215) 861-8803
   3864 Courtney Street, Suite 100 FAX (215) 861-8094
   Bethlehem, PA 18017

4. Homestead (215) 770-1100
   160 Walnut Street FAX (215) 770-1108
   Allentown, PA 18102

5. Clow Valve Company, A Div of McWane, Inc. (714) 735-5555
   1375 Magnolia Avenue FAX (714) 735-0837
   Corona, CA 91719

MANHOLE STEPS

1. MA Industries, Inc. (404) 487-7761
   P.O. Box 2322 FAX (404) 631-4679
   Peachtree City, GA 30269

2. BOWCO Industries, Inc. (800) 232-7837
   P.O. Box 22315 FAX (503) 653-8934
   Portland, OR 97222

3. Press-Seal Gasket Corporation (800) 348-7325
   P.O. Box 10482 FAX (219) 436-1908
   Fort Wayne, IN 46852

4. Cosmos North America (202) 333-3955
P.O. Box 25532 FAX (202) 333-6427
Washington, DC 20007

5. American Step Company (800) 988-STEP
P.O. Box 137 FAX (770) 467-8011
Griffin, GA 30224-0137

C. MANUFACTURERS' REPRESENTATIVES AND/OR SUPPLIERS

1. A & C Utilities Supply Company — (804) 743-1980
   9501 Burge Avenue — FAX (804) 743-3380
   Richmond, VA 23237

2. A.E.W. Enterprises Utility Pipeline Supplies
   480 Collegeville Road — (215) 489-7007
   Collegeville, PA 19426 — FAX (215) 454-9528

3. AVS Associates, Inc. — (301) 833-7676
   P.O. Box 270 — (800) 537-0761
   Glyndon, MD 21071

4. Americast, A Division of Valley Blox, Inc. — (800) 548-4586
   P.O. Box 432
   210 Stone Spring Road
   Harrisonburg, VA 22801

   Americast, A Division of Valley Blox, Inc. — (804) 798-6068
   11352 Virginia Precast Road
   Ashland, VA 23005

5. Aqueous Sales, Inc. — (804) 379-0019
   13630 Hailsham Circle — FAX (804) 794-7499
   Midlothian, VA 23113

6. Chowning Sales Company — (804) 270-2349
   9503 Bonnie Dale Road
   Richmond, VA 23229

7. Coastal Products Company, Inc. — (804) 550-0395
   10962 Richardson Road, Suite F — FAX (804) 550-0951
   Ashland, VA 23005 — E-Mail: Coastal Pro@aol.com
   Attn: Les Thorpe

8. Dominion Pipe & Supply — (804) 743-8010
   P.O. Box 895 — FAX (804) 520-5496
   Mechanicsville, VA 23111

9. Elite Fire Protection, Inc. — (804) 270-1951
   10926 Bush Lake Lane — FAX (804) 273-9871
   Glen Allen, VA 23060
   Attn: Zane Crook

C. MANUFACTURERS' REPRESENTATIVES AND/OR SUPPLIERS (Continued)

10. Flomec, Inc. (804) 794-6300
10821 Trade Road FAX (804) 794-3564
P.O. Box 35610
Richmond, VA 23235-0610

11. Hanson Pipe and Products, Inc. (804) 233-5471
2900 Terminal Avenue
Richmond, VA 23234

12. Hockett and Associates, Inc. (804) 353-1423
1717 Summit Avenue
Richmond, VA 23230

13. Lewis Supply Co., Inc. (804) 232-7801
101 E. 7th. Street
Richmond, VA 23234

14. MAS Sales, Inc. (919) 996-7770
P.O. Box 1308
Kernersville, N.C. 27285-1308

15. Paramount Agency (757) 498-9029
397 W. Farmington Road FAX (757) 431-9132
Virginia Beach, VA 23454

16. Preferred Sources, Inc. (804) 271-4067
9303 Burge Avenue FAX (804) 271-1028
Richmond, VA 23237

17. Reams & Associates 385-7207
3704 Old Forest Road, Suite E Alt# 385-7842
Lynchburg, VA 24501 FAX 385-7983

18. Soter-Martin & Assoc., Inc. (804) 798-1423
P.O. Box 15233
Richmond, VA 23227

19. RFS & Associates, Inc. (540) 428-4440
441 Ridge Court FAX (540) 428-4442
Warrenton, VA 20186

20. SPC Marketing (704) 283-8554
P.O. Box 675 FAX (704) 283-8010
Monroe, NC 28111

21. USA - Utility Sales Associates (804) 794-4710
P.O. Box 1168 FAX (804) 794-1397
Midlothian, VA 23113

22. Water Works Supply (804) 730-9050
8338 Old Richfood Road
Mechanicsville, VA 23111

23. National Waterworks (804) 749-8281
2388 Lanier Road FAX (804) 749-4023
Rockville, VA 23146 Toll Free (800) 474-3878
(formerly A & P, WaterPro, and U.S. Filter)

SECTION 4: MATERIALS SPECIFICATIONS

All products must comply with the Materials Specifications as referenced in Part IV herein, and the Standard Details as reflected in the Department of Public Utilities' Standard Design Specifications and Details Manual. All references to ASTM, AWWA, and other standards shall include latest revisions. In addition, all products must have the approval of the State Health Department prior to the submittal to the PDRC for consideration.

A. WATER SYSTEMS

1. Water Pipe:

a. Ductile iron pipe shall meet the requirements of AWWA C151. Pipe shall be thickness Class 51. Pipe shall have cement-mortar lining and a bituminous seal coat conforming to the requirement of AWWA Standard C104. Thickness class shall meet the requirements of AWWA C150. Minimum wall thickness for pipe shall be as follows: 6"-0.28", 8"-0.30", 12"-0.34", 16"-0.37", 20"-0.39", 24"-0.41", 30"-0.47". A minimum of 5% of the pipe furnished shall be gauged for roundness full length and so marked.

b. Pipe fittings shall meet the requirements of AWWA C110 (ductile iron or cast iron) or AWWA C153 (ductile iron compact). All fittings shall be Pressure Class 250. Fittings shall have a cement-mortar lining and a bituminous seal coating or a 6-8 mil (nominal thickness) fushion bond epoxy lining/coating in compliance with AWWA C550.

c. Pipe and fittings shall have either mechanical joint or push-on joint, both conforming to the requirements of AWWA C111. Bolts shall be high strength cast iron having an ultimate tensile strength of 75,000 psi and a minimum yield point of 45,000 psi.

d. Polyvinyl chloride pipe (PVC) 6", 8", and 12" in size shall conform to the requirements of AWWA Specification C-900, with gasket joints, DR-18 Class 150 with iron pipe O.D. Fittings shall be ductile iron or cast iron, Pressure Class 250, with mechanical joints. Additional criteria as set forth by the County of Chesterfield is outlined in Section 4.C.1. entitled "Supplemental Specifications - Additional Criteria for Polyvinyl Chloride Piping for Water and Sanitary Sewer Systems".

e. Prestressed concrete cylinder pipe with rubber and steel joint shall conform to AWWA Specification C-301. All fittings and pipes shall be cement-lined and emulsion treated.

f. Gaskets - Gaskets for mechanical and push-on joints shall meet the latest AWWA Specifications. Hemp or jute shall not be used. Gaskets for 8" I.D. pipe and smaller shall be 1/16" thick and gaskets for installation on larger size pipe shall be 3/32" thick.

g. Flame Bolts and Nuts - Flange bolts shall be of the length required for various connections. Bolts shall be of steel and have rough square heads made to American Standard rough dimensions and shall be chamfered and trimmed. Bolts and nuts shall be threaded in accordance with American Standard ASA B1.1-1935 coarse thread series, Class 2 fit.

h. Tracing wire shall be 14 gauge copper wire and used with all PVC pipe.

2. Valves:

a. Resilient Seated Gate Valves

1) All resilient gate valves shall fully comply with AWWA C-509 (3"-12") or C-515 (4"-12"), latest revision.

2) All valves shall be manually operated non-rising stem, equipped with operating nut, for installation in a vertical position, unless otherwise specified, and the valve body shall be ductile iron or high strength cast iron with reinforced flanges.

3) All iron surfaces, internal and external must be coated with a minimum 8 mils thickness of hand applied epoxy or 3-5 mils thickness fusion bonded epoxy.

4) The valve stem shall have an independent stem nut (not rigidly attached to the gate) which allows the gate to flex without stressing the stem.

5) All valves shall have either a bronze stem collar bushing with two O-rings above the stem or a stem collar with one O-ring below and one O-ring above the stem collar.

6) Seating shall use compression closure. The gate shall be of a true bi-directional, mirror image design.

7) Valves shall have a smooth bottom design.

8) Valves shall have a port in the bottom of the gate to allow purging of the gate.

9) All valves shall open left and have end connections of Mechanical Joint, or as specified by the Department of Public Utilities.

10) All castings shall be clean and sound without defects. The castings shall be clean and perfect without blow or sand holes or defects of any kind. No plugging, welding or repairing of cosmetic defects will be allowed.

11) Valves 3" through 12" must have a minimum 200 psi working and 400 psi test pressure.

12) If the standard valve provided by a Manufacturer does not fully comply with these specifications, but compliance can be attained by providing optional features, then each valve must be permanently marked to indicate the option or options that have been provided. The method of marking valves to indicate that options are included must be approved by the Product and Design Review Committee.

b. Resilient Seated Wedge Tapping Valves:

1) Tapping valves shall meet above specifications as referenced in a) except, the body seat rings shall have a clear inside opening sufficient to pass a cutter of full diameter and equal to the nominal size of the valve. The outlet end shall be suitable for use with the type of pipe specified, either M.J. or Hub end.

2) Tapping valves will be suitable for use with all approved manufactured tapping sleeves without modification.

3. Butterfly Valves - 16" - 72" - All butterfly valves shall conform to the latest revision of AWWA Standard C-504, Class 150-B unless otherwise indicated and meet the following:

a. Valve bodies shall be cast iron, ASTM A-126 Class B or ductile iron per ASTM A-536 grade 65-45-12. Body ends shall be flanged with facing and drilling in accordance with ANSI B16.1, Class 125 or mechanical joint in accordance with AWWA Standard C-111 or ANSI A21.11. All mechanical joint end valves shall be furnished complete with joint accessories (bolts, nuts, gaskets and glands), and is for underground use only. All valves shall conform with AWWA C-504, Table 3, Laying Lengths For Flanged Valves and Minimum Body Shell Thickness for all Body Types.

b. Valve disc shall be cast iron, ASTM A-126 Class B or ductile iron ASTM A-536, grade 65-45-12. Valve disc shall be of the offset or symmetrical design providing 360 degree uninterrupted seating, and for sizes 30" and larger shall be of the flow through type, cored, or domed.

c. The resilient seat shall be natural rubber or BUNA-N located on the disc or the body retained by an epoxy backing ring or 18-8, Type 304 stainless steel retaining ring secured to the disc by 18-8, Type 304 stainless steel screws. The seat shall be capable of mechanical adjustment in the field and field replaceable without the need for special tools on 24" and larger valves. Valve body seat shall be 18-8, Type 304 Stainless Steel.

d. Valve shaft shall be 18-8, Type 304 stainless steel. Valves shall have either one piece (through shaft) or two piece (stub shaft). The shaft should be attached to the disc by means of O-ring sealed taper pins with lock nuts on 30" and larger valves. Taper pins should be either 304S.S or 416S.S heat treated for added strength or shaft is attached with stainless steel shaft journals hexmated to drive shaft.

e. The valve assembly shall be furnished with a non-adjustable factory set thrust bearing designed to center the valve disc at all times.

f. Shaft bearing shall be contained in the integral hubs of the valve body and shall be of non-cold flowing phenolic backed, PTFE or corrosion resistant self-lubricated sleeve type.

g. Valve shaft seal shall consist of O-rings or Split-V ring. Where the valve shaft projects through the valve body for the actuator connection, the O-ring or Split-V ring packing seal shall be field replaceable as a part of a removable bronze cartridge, without valve disassembly. Connection to the actuator shall be provided by means of at least 2 bolts for 16" - 24" valves and at least 4 bolts for 30" and larger valves.

h. When manual actuators are required they shall be amply sized for line conditions. All manual actuators should be traveling nut or wormgear type. All 16" through 24" butterfly valve manual actuators shall be capable of withstanding 300-450 foot pounds of input torque against the open or closed stops. All actuators shall have adjustable mechanical stop limits. The closed position stop may or may not be externally adjustable.

i. All valves shall be coated with AWWA Standard Epoxy Coatings, in conformance to AWWA Standard C-550, latest revision. All interior ferrous surfaces, including disc, shall be coated a nominal 10 mils thick for long life; and body exterior shall have a minimum 8 mils thickness of hand applied epoxy or 3-5 mils thickness fusion bonded epoxy coating in order to provide protection in shipment and storage, and to afford a superior base for field-applied finish coats.

4. Valve Key Extensions:

a. The extension shall be one and one half inches (1½") solid core steel with the upper operating nut and bottom coupling welded to the stem.

b. The 2" square operating nut on top shall be welded to form a complete box with no openings.

c. 2½" square socket section on bottom shall be tapped on 4 sides for minimum 5/16" N.C. socket head set screws and screws shall be provided.

d. Valve extensions shall be coated with oil-based enamel or other rust preventative coating.

e. The operating nut of the valve shall be drilled on opposite sides to allow insertion of the setscrews.

f. A four and one half inch (4½") diameter steel plate, ¼" thick rock shield, shall be welded to the stem two inches (2") below the bottom of the top operating nut.

5. Tapping Sleeves:

Fabricated Steel:

a. The body of the tapping sleeve shall be of 3/8" carbon steel, ASTM grade A285.

b. Flange to be AWWA C207 Class D ANSI, 150 lb. drilling.

c. The carbon steel body shall have a 12 mil thick coating of fusion-bonded epoxy. Bolts shall be 18-8, Type 304 stainless steel.

d. Gaskets shall be Grade 60 compounded for use with water, alkalies, mild acids and most hydro-carbon fluids, up to 212° F.

Stainless Steel:

a. The body of the tapping sleeve shall be of 18-8 type 304 stainless steel.

b. Branch/flange to be ductile iron, carbon steel or 304 stainless steel, 150 lb. drilling.

c. MJ Gland shall be permanently affixed to the outlet branch and be 304 stainless steel.

d. Gaskets shall be Grade 60 compounded for use with water, alkalies, mild acids and most hydro-carbon fluids, up to 212° F.

e. Clamping hardware (nuts, bolts and washers) shall be 18-8 type 304 stainless steel, with plastic anti-gall washers. Drop-in bolts or welded-on studs are acceptable.

Fabricated Steel with Mechanical Joint Ends

a. Sleeve body, valve flange, gaskets, hardware and coating to be the same as the fabricated steel tapping sleeve.

b. The mechanical joint glands to be ASTMA-36 iron or ductile iron.

c. The gland retaining hardware (nuts, bolts and washers) to be 18-8 type 304 stainless steel.

Cast Iron with Mechanical Joint Ends:

a. The body and glands of the tapping sleeve shall be of ASTM-126, Class B cast or ductile iron. Sleeve shall be furnished complete with all mechanical joint accessories (bolts, nuts, gaskets and glands), and shall have a bituminous seal coating.

b. Valve flange, body gaskets and clamping hardware (bolts, nuts and washers) shall be as specified for the fabricated steel tapping sleeve.

Tapping Sleeve Applications

a. The use of tapping sleeves and valves on the County water system will be considered where it can be shown that installation of a tee and line valve on the existing water main will not be beneficial to the County.

b. The stainless steel, fabricated steel (with mechanical joint ends), or cast/ductile iron (with mechanical joint ends) tapping sleeves may be used for any approved tap on C-900 PVC or ductile iron water main.

c. The stainless steel, fabricated steel (with mechanical joint ends), or cast/ductile iron (with mechanical joint ends) tapping sleeves may be used for all approved taps on asbestos-cement pipe (except 16" size) and for size-one size or one size down taps on all other pipe material.

d. Due to the non-availability of the mechanical joint tapping sleeve for 16" asbestos-cement pipe, the stainless steel sleeve must be used for taps on this pipe.

e. The fabricated steel tapping sleeve may be used for approved two (or more) size down taps on C-900 PVC, cast iron or ductile iron water main.

f. Application Chart:

Taps	Size on Size	Cast Iron, Asbestos Cement, Transite	P.V.C	Ductile Iron
Type of Sleeve	Stainless Steel	***Stainless Steel	Stainless Steel	Stainless Steel
	Mechanical Joint	*Mechanical Joint	Mechanical Joint	Mechanical Joint
			**Fabricated Steel	**Fabricated Steel

* Except on 16" A/C pipe.
** Approved for use on 2 or more downsize taps only.
*** Mueller H300 can not be used on A/C and C.I. pipe.

Certification, Testing and Installation:

a. All tapping sleeves must be crated for shipment with a signed manufacturer's tag certifying that the sleeve meets Chesterfield County specifications. The County inspector shall turn this tag in to the contract file with the location of installation noted on the tag.

b. Rigorous testing and conditions relating to tapping sleeves, applied to all manufacturers, is standard operating procedure. These conditions are as follows:

1) The tapping sleeve shall be tested in place to a minimum of 200 psi. It is the contractor's responsibility to order the correct pressure rated tapping sleeve. However, for pre-stressed concrete steel cylinder pipe, taps 12″ or less shall be tested to 150 psi and taps larger than 12″ shall be tested at 10% above the line pressure of the main being tapped.

2) If the sleeve fails the 200 psi pressure test, the original failed sleeve shall be replaced with an entirely new sleeve.

3) The concrete thrust block shall be poured to also support the tapping sleeve from beneath. The tapping sleeve, valve and tapping machine assembly is to be adequately supported during the tapping operation to prevent movement or rotation of the tapping sleeve.

4) Installation instructions must be followed in strict accordance with the latest County's procedures.

6. Double Check Assembly

a. Valve Pit:

1) Valve pits shall be of adequate size and readily accessible for inspection, testing, maintenance, and removal of equipment contained therein. They shall be constructed and arranged to properly protect the installed equipment from movement of earth, freezing, and accumulation of water. Poured-in-place or precast concrete, with reinforcement, are appropriate materials for construction of valve pits. Pits constructed of block material are <u>not</u> acceptable. Precast concrete vaults will be as reflected on the standard detail drawings (Part II of this document).

2) The vault shall be watertight. The vault shall be coated on the outside face with a mastic or bituminous coating to prevent infiltration.

3) The vault will contain positive drainage. A sump with gravity flow is required if water table problem does not exist. Where water table problem exists, a sump pump is required.

4) Pipe penetrations shall be sealed with "Link-seals", a waterproof mastic coating or equal. A clearance of 1"-3" shall be provided around the pipe where the fire line enters and exists the pit.

5) Vaults greater than 3.0' in depth will have some type of ladder provided for ingress and egress.

6) The entrance hatch to the vault will be a JD-2AL 4'-0" x 4'-0" Bilco door, or as manufactured by Elite Fire Protection, Inc., Hydro Tap Service, Inc.; or approved equal.

b. Valving:

1) The double check valve assembly shall be a Watts No. 709 or equal surrounded by an OS&Y gate valve on both the inlet and outlet side of the assembly.

2) The Fire Department connection may or may not be located in the vault. The use of post indicating valves, location of the Fire Department connection, and other related fire questions will be addressed by the Fire Department.

3) Pipe stands such as poured concrete or fabricated metal shall be provided to support the entire assembly. Metal Pipe stands shall be galvanized or be coated with an acceptable paint to prevent rust. Concrete block or brick is <u>not</u> an acceptable support material.

7. Fire Hydrants:

a. Fire hydrants shall be manufactured in full compliance with this specification and shall also comply with the American Water Works Association Fire Hydrant Specification C-502, latest revision and the following:

1) Type: Compression - Dry Standpipe: Valve shall open against and close with the pressure. The design shall be such that all internal operating parts can be removed through the standpipe and main valve rod extended without excavating.

2) Size: Internal valve diameter shall be a minimum 4½".

3) Inlet Size and Type: 6" mechanical joint end with accessories.

4) Hose Nozzles: Each hydrant shall be equipped with two 2½" I.D. hose nozzles with National Standard threads, one quarter turn bayonet lock or threaded in with O-ring seal and suitable locking arrangement.

5) Steamer Nozzle: Each hydrant shall be equipped with one 4½" Steamer Nozzle having National Standard Threads, one quarter turn bayonet lock, or threaded in with O-ring seal and suitable locking arrangement.

6) Direction of Open: Left, counter-clockwise.

7) Size and Shape of Operating Nut and Cap Nuts: to be 1½" point to flat pentagon. Each hydrant shall be equipped with a weather cap or weather seal.

8) Seal Plate: The hydrant shall be so constructed that a moisture-proof lubricant chamber is provided which encloses the operating threads, thereby automatically lubricating the threads each time the hydrant is operated. The lubricant chamber shall be enclosed with at least three O-rings. The two lower O-rings will serve as pressure seals; the third O-ring will serve as a combined dirt and moisture seal to prevent foreign matter from entering the lubricant chamber. The hydrant shall be equipped with either an anti-friction washer or bronze bushing to reduce operating torque. The bonnet will be secured to the hydrant using bolts and nuts.

9) Standpipe - Groundline Safety Construction: The standpipe sections shall be connected at the groundline by a two part, bolted safety flange or breakable lugs. The main valve rod sections shall be connected at the groundline by a frangible coupling. The standpipe and groundline safety construction shall be such that the hydrant nozzles can be rotated to any desired position without disassembling and removing the top operating components and the top section of the standpipe. The minimum inside diameter of the standpipe shall be 6".

10) Main Valve, Rod Assembly: The main valve rod assembly shall be so constructed to allow removal of all operating parts through the standpipe regardless of depth of bury, using a removal wrench which does not extend below the groundline of the hydrant. The main valve seat ring shall be bronze and its assembly into the hydrant shall involve bronze to bronze thread engagement, and the valve assembly pressure seals shall be obtained without the employment of torque compressed gaskets. The design of the main valve rod shall be such that the operating threads at the top of the rod and the valve assembly threads at the bottom of the rod are isolated from contact with water in the standpipe or in the hydrant inlet shoe.

11) Drain Valve: The operation of the drain mechanism shall be correlated with the operation of the main valve and shall involve a momentary flushing of the drain ports each time the hydrant is opened. The drain ports shall be fully closed when the hydrant valve is more than 2½ turns open and the drainage channel in the bronze valve seat ring shall connect to two or more outlet drain ports. No springs may be employed in the hydrant valve or drain valve mechanism.

12) Depth of Bury: Hydrant shall be suitable for installation in trenches 4½' deep, unless otherwise specified.

13) Painting Instruction: Two prime coats and one aluminum finish coat shall be used, unless otherwise specified. Exposed area of fire hydrant shall receive one field coat of aluminum after installation. The wetted surface of the hydrant shoe shall be epoxy coated to prevent corrosion of the waterway.

14) Pressure Rating: Test pressure 300 psi, working pressure 150 psi.

b. If the standard hydrant provided by a manufacturer does not fully comply with these specifications, but compliance can be attained by providing optional features, then each hydrant must be permanently marked to indicate the option or options that have been provided. The method of marking hydrants to indicate that options are included must be approved by the Product and Design Review Committee.

8. Check Valves:

Check valves shall be of the horizontal swing type; iron body bronze mounted, equipped with weighted lever or spring as specified or shown on the plans.

9. Water Service Assembly for 5/8" Water Meters: All materials for the installation of water services shall be as follows or approved equal:

a. Water meter boxes (for use with all 5/8" and 1" meters) shall be as manufactured by Mid-States Plastics, Inc. for high density polyethylene boxes or approved equal.

The meter box shall be 24" high with a cover and reader lid. The box shall have a 1¼" anti-settling flange on the bottom edge. It shall be made of hi-density polyethylene plastic of one piece, molded construction for durability with dimensions as shown on the standard detail in Part II of this document. The box must have solid walls with an average thickness of no less than .550" and have been tested to withstand a 15,000 lb. vertical load freestanding. The inside color shall be white to reflect light for ease of meter reading and the outside shall be black to protect against UV degradation during prolonged exposure to sunlight i.e. during outside storage. All edges shall be clean an smooth for safety during handling.

The meter box cover shall be one-piece, with reader lid made of cast iron for 5/8" and ductile iron for 1" boxes. One piece cover designed to fit the corresponding opening in the meter box frame and have a square treadplate surface design. "WATER METER" shall be on the reader lid.

The lid dimensions shall be: for 5/8″ box – 15.437″ x 10.125″ with a minimum weight of 17 lbs. and for 1″ box – 11.125″ x 18″ with a minimum weight of 21.5 lbs. It shall have a minimum thickness of .25", with tensile strength 65,000 psi, yield strength 45,000 psi. The castings shall be made of ductile iron and conform to ASTM A536-80.

b. Water meter boxes used in traveled areas shall be made of cast iron as manufactured by Capitol Foundry or approved equal. Material shall consist of gray iron per ASTM A-48 (latest revision) Class 30.

c. Meter yokes/setters shall be 3/4″ for 5/8″ meter with saddle nut. Inlet and outlet sides of meter setter shall be equipped with 3/4" flare or compression copper coupling.

d. 3/4" Corporation stop with corporation cock thread inlet shall be those as specified in the approved materials list shown in Section 1 entitled Water System.

e. Pipe shall be 3/4" type "K" copper domestic manufactured.

f. Tail piece on yoke shall be 3/4" type "K" copper and be long enough to extend 18" outside of meter box.

g. Service Saddles:

1) All saddle castings must be ductile iron and meet the requirements of ASTM A-536-80, protected with epoxy or nylon coating.

2) All saddles must have a minimum of two (2) 1 1/2" wide (including bolts) stainless steel straps type 304 (18-8) where welds are passivated for resistance to corrosion. Exception: Ford FS202 which has two (2) bolts and a single strap with a minimum width of 3 1/4".

3) Gaskets must be made of Virgin NBR compound.

4) Service saddles are required on all taps made onto PVC pipe.

10. Water Service Setter for 1", 1 1/2" and 2" Water Meters: All Materials for the installation of water services shall be as follows or approved equal:

a. The water meter box and cover (for use with all 1"meters) shall be as manufactured by Mid-States Plastics, Inc. for high density polyethylene boxes or approved equal. The boxes shall conform to the specifications as outlined under the "Water Meter Assembly for 5/8" Water Meters" and the dimensions as specified in the standard detail shown in Part II of this documents for 1" meters.

b. **General:** All 1 1/2" and 2" meter setters shall be constructed of seamless threaded red brass pipe, standard Type K hard copper tube (per ASTM B-88-62,) high quality brass (per AWWA C-800,) and leadless solder, and provide horizontal female pipe threads on both front and rear connections. Setters must include a valued bypass for meter maintenance, except for 1" irrigation and residential meters (see Part V - Section 1).

Meter setters for 1" meters shall be 1" x 12" riser meter yokes with copper tube flare nut or compression on the inlet and outlet sides.

Meter setters for domestic use at businesses, Doctor or Dentist offices etc., shall be equipped with a valued bypass for meter maintenance. Setters for residential or irrigation uses etc., shall NOT be equipped with a bypass.

c. **Bypass:** Meter setters shall have an appropriately sized bypass line with an inverted key or ball type stop threaded directly into the inlet bypass tee fitting. This bypass valve shall have a solid tee head and be either lock wing type or provide a bracket or other device to lock this valve in the "off" position upon installation. If copper tube is used for the bypass line, the compression connection for the copper side of the bypass valve must be as produced by the following manufacturers:

Mueller Co., "110" compression connection for copper pipe; or

Ford Meter Box Co., "Pack Joint" connection for copper pipe; or

A. Y. McDonald, "T" compression connection for copper pipe.

Otherwise, a tee head inverted plug or ball type bypass valve is required with a threaded connection. Both of the bypass tee fittings, (inlet and outlet,) shall have brace pipe eyelets cast within them to stabilize setter upon installation, if necessary.

d. **Angle Valves:** Flanged, inverted key or ball-type "tee head" angle valves are required on both meter connections, and will include lock wings and meter support bracket to aid in meter installation. Pack Joint or Compression connections are NOT allowed on the vertical riser pipe; these connections must be threaded or soldered copper. Valves shall be double drilled, (2" size only,) to accommodate both 1 1/2" and 2" meters. Angle or ball valves shall provide a stop or check to limit movement of tee head at 90° Maximum, (from fully open to completely off.) Arrows cast within the inlet valve shall indicate direction of flow while in service.

e. **Dimensions:** Meter setters shall accommodate the following meter dimensions:

1" Male x male pipe thread laying length: 10 3/4"± 1/16"

1 1/2" Flanged meter laying length: 13", plus gaskets

2" Flanged meter laying length: 17", plus gaskets

The rise or height of meter setter, measured vertically from center line of inlet pipe thread to center line of meter flange bolt shall be:

1" Meter setter, maximum height of 12"

1 1/2" Meter setter, maximum height of 8 1/2"

2" Meter setter, maximum height of 9 1/2"

The copper used on the bypass and vertical riser pipe, if so equipped,) shall be Type K and comply with ASTM B-88-62, which states outside diameters as shown here:

3/4" Nominal pipe size, .875" outside diameter, .065" wall

1" Nominal pipe size, 1.13" outside diameter, .065" wall

1 1/4" Nominal pipe size, 1.38" outside diameter, .065" wall

1 1/2" Nominal size pipe, 1.63" outside diameter, .072" wall

2" Nominal size pipe, 2.13" outside diameter, .083" wall

The bypass assembly shall be sized as follows:

1" Meter setter requires minimum 3/4"

1 1/2" Meter setter requires minimum 1 1/4" bypass pipe & valve

2" Meter setter requires minimum 1 1/4" bypass pipe & valve

11. Valve Boxes: All underground valves shall be installed in approved cast iron valve boxes, having suitable base and shaft sections and covers to protect the valve and permit easy access and operation. Box assemblies shall have slip adjustment (two-piece sliding type adjustable valve box).

12. Air Release Valves: All valves shall be designed in accordance with the following standard and/or by the Engineer as required.

a. Type 1: Small orifice valves shall be either of the kinetic design type, employing only one moving part, a stainless steel float ball or of the stainless steel float and lever type. It shall maintain closed position to prevent the loss of water by positive seating of the float ball against a smoothly ground contact surface of the exhaust orifice.

It shall automatically provide for the escape of air to atmosphere without the loss of water when the float ball moves away from the orifice seat. The body of the valve shall be cast iron and shall be coated to withstand moist environment.

Valve shall have a minimum of a one-inch N.P.T. inlet for 6", 8" and 12" pipe sizes and a two-inch N.P.T. inlet for pipes 16" and larger; and shall have a minimum of a 3/32" outlet orifice for 6", 8" and 12" pipe sizes and a 3/16" outlet orifice with 16" and larger pipes.

Valve shall be suitable for 150 psi working pressure.

b. Type 2: Shall be a combination, dual unit valve, combining one (1) small and one (1) large unit, both employing the kinetic operating principal or of the stainless steel and lever type. For the Kinetic type, the only moving parts shall be two (2) stainless steel balls (one for each unit) which will remain in the respective throat areas when discharging air without blowing shut or collapsing the float ball(s).

In the closed position, resulting from water filled line, the valve shall prevent leakage.

The large orifice seat shall be of composition material and replaceable.

The body of the valve shall be cast iron and shall be coated to withstand moist environment.

Valve size shall be six (6) inch with 3/8" orifice for small unit and shall be suitable for 150 psi working pressure.

13. Manholes:

a. Gate Valve Manhole and Air Release Manhole: Shall be concrete, ASTM C-478 and diameters shall be as shown on plans and meets the specifications as described in Part V, Section B of this document entitled "Sanitary Sewer Systems".

14. Joint Restraint Systems:

When gray cast or ductile iron fittings are used with AWWA C900 PVC pipe in sizes up to 12 inches or Ductile Iron Pipe in sizes up to 48 inches and the engineer has determined thrust blocking will not provide adequate thrust restraint, an approved Mechanical Joint Restraint System can be installed.

Under normal conditions, the approved method of restraint shall be concrete thrust blocking per County standard details for dead-ends (cul-de-sacs, etc.) ; and horizontal bends, reducers, tees and crosses; and a Mechanical Joint Restraint System for vertical bends, all valves, and carrier pipe thru casings. Mechanical Joint Restraint Systems must be used in certain other approved conditions or special applications (i.e., poor soils) in Chesterfield County's Public Water System, as shown in the following table:

Piping Location	Method of Restraint
Dead Ends (Culdesac), etc	Concrete Thrust Block
Horizontal Bends, Reducers, Tees, & Crosses:	
good soil condition	Concrete Thrust Block
poor soil condition, i.e. creeks, fills, etc. as determined by design engineer	Approved Mechanical Joint Restraint System
Carrier Pipe thru Casings	Approved Mechanical Joint Restraint System
Vertical Bends	Approved Mechanical Joint Restraint System
Fire Hydrant Laterals	Approved Mechanical Joint Restraint System or Concrete Thrust Block
*All Valves	Approved Mechanical Joint Restraint System

*All valves should be as close to a tee as possible and restrained to that tee, using approved mechanical joint restrainers. Where the valve cannot be installed and restrained at a tee, the valve (12" and larger) must be restrained using an approved Mechanical Joint Restraint System. However, where valves are installed on permanent dead-end lines, only the feed side needs to be mechanically restrained.

When Mechanical Joint Restraint Systems are required due to specific applications) as referenced above, special design considerations, or poor soil conditions the engineer shall provide the calculations used in determining the required length of pipe on either side of the fitting to be restrained. Also, the engineer shall provide special plan details for each necessary mechanical joint restraint system with a justification for its determined installation over thrust blocking.

Mechanical Joint Restraint Systems require that sufficient lengths of pipe in addition to the fittings, be restrained. The standard length of pipe requiring restraint varies from application to application and is designed based on variables such as soil bearing capacity, soil condition, pipe size, pipe material, pressure and fittings.

Where conditions are encountered in the field during construction in which thrust blocks do not provide the required thrust protection, the Developer's and/or County's contractor shall be responsible for insuring that the engineer and those individuals on the County staff responsible for plan review prior to plan approval are contacted to evaluate and/or adjust the design appropriately. The County's Inspector should consult with the Operations and Maintenance personnel if there are any questions about whether field conditions warrant special or additional restraint systems due to unsuitable soil conditions encountered during construction.

All restraint devices must be UL listed and FM approved. Restraints are acceptable for PVC and D.I. pipe under the following conditions:

a. For PVC Pipe

Where PVC pipe is connected to fittings, mechanical joint restraint shall be incorporated in the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases. Flexibility and minimal deflection of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A536-80. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 BHN. There shall be no dissimilar metals allowed. Dimensions of the gland shall be such that it can be used with all AWWA approved standardized mechanical joint bell and tee-head bolts conforming to ANSI/AWWA A21.11 and ANSI/AWWA C153.53/A21.53 of latest revision. The mechanical joint restraint device shall have a working pressure of at least twice the working pressure of the pipe with a minimum of 150 psi. Twist-off nuts shall be used to insure proper actuating of the restraining devices.

All bell and spigot end joints within this length shall be restrained with a clamping ring and an additional ring designed to fit behind the bell end of the PVC pipe. The rings shall be connected with T-Head Bolts or Rods.

All clamping rings shall incorporate serrations on the inside surface to provide positive restraint on the outside surface of the pipe and shall provide full support around the circumference of the pipe to maintain roundness.

Restraining devices shall have a pressure rating equal to or greater than the PVC pipe, and shall be capable of withstanding a minimum test pressure of 2 times the pressure rating of the device.

Restraining devices and T-bolts shall be manufactured from high strength ductile iron, ASTM A536, Grade 65-45-12. Clamping bolts and nuts shall be manufactured from completely corrosion resistant COR-TEN STEEL or equal.

Restraining devices shall be as approved by Chesterfield County's Product and Design Review Committee.

b. For Ductile Iron Pipe

Mechanical joint restraint shall be incorporated in the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases. Flexibility and minimal deflection of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A536-80. Twist-off nuts shall be used to insure proper actuating of the restraining devices.

Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 BHN. There shall be no dissimilar metals allowed. Dimensions of the gland shall be such that it can be used with all AWWA approved standardized mechanical joint bell and tee-head bolts conforming to ANSI/AWWA A21.11 and ANSI/AWWA C153.53/A21.53 of latest revision. The mechanical joint restraint device shall have a working pressure of at least twice the working pressure of the pipe.

All bell and spigot end joints within this length shall be restrained with a clamping ring and an additional ring designed to fit behind the bell end of the DI pipe. The rings shall be connected with T-Head Bolts or Rods. Rods must be protected from corrosion either by rod material or coating.

15. Markers:

a. All markers shall have one of the applicable decal description to reflect the following:

1) Upper decal, white and blue 2 7/8" x 11" standard, worded "CAUTION WATER PIPELINE".

or

2) Upper decal, white and blue 2 7/8" x 11" standard, worded "CAUTION WATER VALVE".

b. In addition, the lower decal shall contain the following:

1) Lower decal, white and blue 2 7/8" x 1 3/4" standard, worded "MISS UTILITY - 1-800-552-7001, CHESTERFIELD UTILITIES".

c. Total height shall be 66".

d. Basic marker shall be white in color.

16. Flushing Hydrants - (Chesterfield Model): Flushing hydrants shall be manufactured in full compliance with the following specifications and shall also comply with AWWA's latest specifications on flushing hydrants:

a. The flushing hydrant shall offer a 360-degree directional discharge and shall have easy above ground accessibility at all times. It shall be capable of being locked and shall be freeze-proof. It shall be equipped with National Standard fire thread connections and a breakaway union for high traffic areas.

b. It shall be of size 2".

c. The hydrant barrel shall be 2" iron pipe. The exterior shall be painted with approved coating for durability. The overall length of hydrants can vary according to the depth of water systems.

d. The barrel and the standpipe shall be joined with a breakable malleable union. A brass hose connection, 2 1/2" NSFT with attached cap and chain, shall be provided for convenience in flushing.

e. The body valve shall have bronze body with automatic weep, such that when the valve is in OFF position the hydrant barrel shall automatically drain. The valve stem shall be above ground and shall be lockable to prevent tampering. Its operating device shall be of key type design, with permanent attachment to the valve stem.

17. Cast Couplings:

Center Sleeve: Made of ductile iron, Spec ASTM-A536, and coated with an enamel shop coat, sized to accommodate all AWWA pipes of the same nominal size. The center sleeve length of long barrel (sleeve)_couplings shall be a minimum of 10”.

End Ring: Made of ductile iron Spec ASTM-A536, and color coded with an enamel shop coat to easily identify its use on various types of pipe.

Gaskets: SBR rubber compound, Grade 30 per Spec ASTM D-2000 for normal water service and an extended shelf life.

Bolts: High strength low alloy steel bolts with heavy hex nuts, per AWWA C-111.

18. Casing Spacers:

Casing Spacers shall be bolt on style with a shell made in two sections of heavy T-304 stainless steel. Connecting flanges shall be ribbed for extra strength. The shell shall be lined with a PVC liner .090" thick with 85-90 durometer or neoprene rubber. All nuts and bolts are to be 18-8 stainless steel. Runners shall be made of ultra high molecular weight polymer (UHMW) or glass reinforced plaster. Runners shall be supported by risers made of heavy T-304 stainless steel or 10 gauge welded steel. The supports shall be mig welded to the shell and all welds shall be passivated or 3/8" diameter stud welded to band and locked with a locking fastener. The height of the supports and runners combined shall be sufficient to keep the carrier pipe at least .75" from the casing pipe wall at all times.

B. SANITARY SEWER SYSTEMS

1. Sewer Pipe and Fittings:

a. Reinforced concrete pipe, fittings and specials shall meet requirements of ASTM C76 minimum Class II unless stronger pipe is required by the plans and specifications. Pipe ends shall have O-ring gasket groove provided during manufacturing process.

Rubber gaskets and joints of concrete pipe shall meet requirements of ASTM C361.

Pipe and joints shall be tested in accordance with Section 11 of ASTM C76 and ASTM C443. If requested by Department of Public Utilities or Engineer, test reports shall be submitted to the Engineer.

b. Polyvinyl chloride (PVC) nonpressure pipe (6"-15") and fittings shall meet requirements of ASTM D3034 Type PSM SDR-35 or ASTM F1760 SDR-35 with elastometric gasket joints meeting requirements of ASTM D3212. Bedding shall be as required by the County for plastic pipes as shown in the County's Standard of Details. Additional criteria as set forth by the County of Chesterfield is outlined in Section 4.C.1. entitled "Supplemental Specifications - Additional Criteria for Polyvinyl Chloride Piping for Water and Sanitary Sewer Systems".

c. Polyvinyl Chloride (PVC) non-pressure pipe (18"-48") and fittings shall meet requirements of ASTM F679, Table I Type SDR-35 for large diameter solid wall PVC pipe with elastometric gasket joints meeting requirements of ASTM D3212. Bedding shall be as required by the County for plastic pipes as shown in the County's Standard of Details.

d. Perma-Loc (Series 46) PVC nonpressure sewer pipe (21"-36") and fittings shall meet requirements of ASTM F794 specification for large diameter ribbed sewer pipe with elastometric gasket joints meeting requirements of ASTM D3212 and fittings based on controlled inside diameter. Bedding shall be as required by the County for plastic pipes as shown in the County's Standard of Details.

e. Ultra-Rib PVC Gravity (non-pressure) sewer pipe (21"-36") shall meet requirements of ASTM F794 and fittings shall meet the requirements of ASTM 3034-35 PVC sewer pipe with elastometric gasket joints meeting requirements of ASTM D3212. Bedding shall be as required by the County for plastic pipes as shown in the County's Standard Details.

f. Carlon Vylon H.C. PVC Gravity (non-pressure) sewer pipe (21"-48") shall meet requirements of ASTM F794 and fittings shall meet the requirements of ASTM 3034-35 PVC sewer pipe with elastomeric gasket joints meeting requirements of ASTM D3212. Bedding shall be as required by the County for plastic pipes as shown in the County's Standard Details.

g. Ultra-Corr PVC sewer pipe (24"-36") shall be seamless profile wall and meet the requirements of ASTM F794 and fittings shall meet the requirements of ASTM 3034-35 PVC sewer pipe with elastomeric gasket joints meeting requirements of ASTM D3212. Bedding shall be as required by the County for plastic pipes as shown in the County's standard details. Pipe shall have a smooth interior with a corrugated cross-sectional rib exterior. Exterior corrugations shall be perpendicular to the axis of the pipe to allow placement of the sealing gasket without field marking, beveling, sealing channels, gluing, welding, additional cutting or machining. The pipe stiffness shall be a minimum of 50 psi when tested at 5% deflection in accordance with D2412. Pipe shall be green in color.

h. Ductile iron pipe shall meet requirements of AWWA C151. Pipe shall be thickness Class 52. Pipe shall have cement-mortar lining and a bituminous seal coat. Thickness classes shall meet requirement of AWWA C150.

i. Cast iron fittings shall meet requirements of AWWA C110. Fittings shall have cement-mortar lining and a bituminous seal coat.

j. Mechanical joints and jointing materials shall meet requirements of AWWA/ANSI C111/A21.11.

k. Push-on-joint and rubber gasket shall meet requirements of AWWA C111.

1. Cement mortar lining with bituminous seal coat for ductile iron pipe and fittings shall meet requirements of AWWA/ANSI C104/A21.4.

Cement mortar lining shall be standard thickness.

m. Exterior bituminous coating for cast iron fittings and ductile iron pipe shall meet requirements of AWWA/ANSI C106/A21.6 or AWWA/ANSI C151/A21.51 as applicable.

2. Sanitary Sewer Manholes:

a. Manholes shall be constructed of precast reinforced concrete manhole sections in accordance with requirements of ASTM C478 and as shown on the Standard Details.

b. A maximum of two lift holes per manhole section may be provided.

c. Provide tongue and groove joints in manhole sections with a preformed groove in the tongue for placement of an O-ring type round, rubber gasket or Press Seal, Inc's Profile RS gasket.

Gasket shall comply with requirements of ASTM C361.

Gasket shall provide the sole element in sealing the joint from either internal or external hydrostatic pressure.

d. Provide flexible pipe connections to manholes for pipes 21 inches in diameter and smaller in size.

Materials shall consist of EPDM and elastomers designed to be resistant to water, sewage, acids, ozone, weathering and aging. Use neoprene conforming to ASTM C443 and ASTM C923 and all stainless steel elements of the connector shall be totally non-magnetic Series 304 Stainless, excluding the worm screw for tightening the steel band around the pipe which shall be Series 305 Stainless. The worm screw for tightening the steel band shall be torqued by a break-away torque wrench available from the precast manhole supplier, and set for 60 - 70 inch/lbs.

Cast or core drill openings in manholes to receive connectors. Connectors shall be suitable for field repair or replacements. Connectors not suitable for field replacement are unacceptable.

The assembled connectors shall allow at least an 11° angular deflection of the pipe and at least one inch of lateral misalignment in any direction and be suitable for a normal variation in diameter or roundness for the pipe material used.

Connectors shall be Kor-N-Seal as manufactured by National Pollution Control Systems, Inc. or approved equal.

e. Manhole steps shall be corrosion-resistant and shall be one-half inch grade 60 steel reinforcing rod encapsulated in a copolymer polypropylene. The steps shall conform with ASTM C478 paragraph 11 and to the dimensions shown on the Standard Details.

f. Manhole frames and covers shall be molded of gray cast iron conforming to ASTM A48, Class 30. Castings shall not be coated. Seating surfaces between frame and cover shall be machined. The dimensions and weights shall conform to the requirements shown on the Standard Details.

g. Sealant for manhole frames shall be a one-component polyurethane sealant similar to Sika "Sikaflex" type 430.

h. Sealant for flexible pipe connections shall be a two-component polysulfide sealant similar to Sika "Sikaflex" type 412 with primer type 419.

i. All manholes shall be watertight.

3. Sewage Air/Vacuum Break Valves without Bias Mechanism - All valves shall be designed in accordance with the following standard and/or by the Engineer as required:

The Sewage Air Release and Vacuum Break Valve shall consist of a compact tubular all stainless steel fabricated body, hollow direct acting float and solid large orifice float in H.D.P.E. – stainless steel nozzle and woven dirt inhibitor screen, nitrile rubber seals and natural rubber seat.

The valve shall have an integral “Anti-Surge” Orifice mechanism which shall operate automatically to limit transient pressure rise or shock induced by closure to less than 1.5x valve rated working pressure.

The intake orifice area shall be equal to the nominal size of the valve i.e., a 6” valve shall have a 6” intake orifice.

Large orifice sealing shall be effected by the flat face of the control float seating against a nitrile rubber ‘O’ ring housed in a dovetail groove circumferentially surrounding the orifice.

Discharge of pressurized air shall be controlled by the seating and unseating of a small orifice nozzle on a natural rubber seal affixed into the control float. The nozzle shall have a flat seating land surrounding the orifice so that damage to the rubber seal is prevented.

The valve construction shall be proportioned with regard to material strength characteristics, so that deformation, leaking or damage of any kind does not occur by submission to twice the designed working pressure.

Connection to the valve inlet shall be facilitated by flanged ends conforming to ANSI B16.1 Class 125 or Class 250 Standards.

Flanged ends shall be supplied with the requisite number of stainless steel screwed studs inserted for alignment to the specified standard. **Nuts, washers, or jointing gaskets shall be excluded.**

4. **Sewage Air/Vacuum Break Release Valves with Bias Mechanism -** All valves shall be designed in accordance with the following standard and/or by the Engineer as required:

   The Sewage Air Release and Vacuum Break Valve shall consist of a compact tubular all stainless steel fabricated body, hollow direct acting float and solid large orifice float in H.D.P.E. – stainless steel nozzle and woven dirt inhibitor screen, nitrile/E.P.D.M. rubber seals and natural/E.P.D.M. rubber seat.

   The valve shall have an integral 'Anti-Surge' Orifice mechanism which shall operate automatically to limit surge pressures or shock induced by liquid oscillation and/or rapid air/gas discharge to less than 1.5x valve rated working pressure.

   The intake orifice area shall be equal to the nominal size of the valve i.e., a 6" valve shall have a 6" intake orifice. Large orifice sealing shall be effected by the flat face of the control float seating against a nitrile/E.P.D.M. rubber 'O' ring housed in a dovetail groove circumferentially surrounding the orifice.

   Discharge of pressurized air shall be controlled by the seating and unseating of a small orifice nozzle on a natural/E.P.D.M. rubber seal affixed into the control float. The nozzle shall have a flat seating land surrounding the orifice so that damage to the rubber seal is prevented.

The valve construction shall be proportioned with regard to material strength characteristics, so that deformation, leaking or damage of any kind does not occur by submission to twice the designed working pressure.

Connection to the valve inlet shall be facilitated by flanged ends conforming to ANSI B16.1 Class 125 and Class 250 and ANSI B16.5 Class 150 and Class 300 Standards.

Flanged ends shall be supplied with the requisite number of stainless steel screwed studs inserted for alignment to the specified standard. **Nuts, washers, or jointing gaskets shall be excluded.**

5. Sewage Plug Valves

a. All plug valves shall be of the non-lubricated, eccentric type with resilient faced plug and round ports of no less than 90%, or rectangular ports of no less than 80%, of the connecting pipe area, except valves of 24" or larger size shall have port areas of no less than 70% of the connecting pipe area.

b. Valves shall be for buried underground service as well as plant service and shall be rated for 175 psi up to 12" and 150 psi for sizes 14" and larger. Drop-tight shut off shall be provided at full rated working pressure in the standard flow direction and 50 psi in the reverse direction, except when full-rated sealing is required in both directions.

c. Valves 6" and larger shall be equipped with geared actuators with a 2" square operating nut. Handwheel and power actuated valves shall also include a 2" square operating nut for emergency operation.

All gearing shall be enclosed in a semi-steel housing and be suitable for running in a lubricant with seals provided on all shafts to prevent entry of dirt and water into the actuator. The actuator shaft and the quadrant shall be supported on permanently lubricated bronze bearings. Actuators shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque and to provide seat adjustment to compensate for change in pressure differential or flow direction change. All exposed nuts, bolts and washers shall be zinc plated.

Valves and gear actuators for buried or submerged service shall have seals on all shafts and gaskets on the valve and actuator covers to prevent the entry of water. Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gasket seals. All exposed nuts, bolts, springs and washers shall be stainless steel.

d. Valves shall open left (counterclockwise) and shall have mechanical joint end connections, or as specified by the Department of Public Utilities.

e. Valve bodies and all other cast iron parts shall conform in all respects to the American Society for Testing Materials' Standard Specifications of Gray Iron Castings, ASTM Specification Designation A-126, Class B. The castings shall be clean and perfect without blow or sand holes or defects of any kind. No plugging or stopping of holes will be allowed.

Body ends shall be flanged with facing and drilling in accordance with ANSI B16.1, Class 125 or mechanical joint in accordance with AWWA Standard C-111 or ANSI A21.11. All mechanical joint end valves shall be furnished complete with joint accessories (bolts, nuts, gaskets and glands).

f. Valve bodies shall be furnished with a raised seat surface completely covered with 90% pure nickel to insure that the resilient plug face contacts only nickel, or a one-piece 304 stainless steel seat ring threaded to the body. The nickel seat must be welded to the valve body or the body seat ring to produce a metallurgical bond with interpenetration to the base metal with a bond strength equal to or greater than the valve body or seat ring material. The nickel or stainless steel seat must be machined to a finish of not more than 16 micro-inches to achieve minimal friction and wear to the resilient plug face during valve operation. Whether welded or screwed, the valve seat shall be designed to provide uniform contact with the resilient plug face and to prevent the plug face from contacting any cast iron surface. Resilient seats or seats attached to the body by screws or any other method not specified herein are not acceptable. Plated or sprayed nickel seats or epoxy seats are not acceptable.

g. Valve bodies shall be furnished with an adjustable closed position stop. The seat end and standard flow direction shall be cast onto the valve body.

h. Resilient faced plug/operating shaft shall be of a one piece design of ASTM A126 Class B cast iron with a seating surface eccentrically offset from the center of the plug shaft, and shall have a precision molded resilient facing of chloroprene (Neoprene), Buna-N (nitrile) or nitrile-butadiene (Hycar). With the valve in the open position, all surfaces of the plug/shaft shall be substantially out of the fluid flow path.

i. Valve shaft journal bearings shall be sleeve type, sintered, oil impregnated, permanently lubricated, type 316 ASTM A743 grade CF-8M or AISI type 317 L stainless steel, or phenolic backed Teflon. Thrust bearings shall be located in the upper and lower journal areas and shall consist of stainless steel, Teflon, or a combination of those materials. Grit seals shall be provided in the upper and lower journals to prevent abrasive material from entering the bearing and seal areas.

j. Valve shaft seals shall conform to AWWA Standard C504-87, Section 3.7 and shall be of the bronze cartridge type utilizing O-rings, or the adjustable multiple V-ring type and shall be replaceable without disassembling the valve, while the valve is under system pressure.

k. Valve interiors and exteriors shall be coated according to AWWA Standard C550-90 with a two-component high build epoxy suitable for potable water service, with interior surfaces receiving 8 - 10 mils (dry film thickness) and exterior surfaces receiving 3 - 5 mils (dft) or 8 - 10 mils (dft) hand-applied epoxy coating. For buried or submerged service, 8 - 10 mils (dft) of asphalt varnish may be substituted for the exterior coating.

l. Valve testing shall be conducted per AWWA C504-87 Section 5, covering rubber seated butterfly valves. Each valve shall be performance tested per paragraph 5.2 assuring valve operation.

   Body seat and shell leakage testing is to be conducted on each valve as per paragraphs 5.3 and 5.4.

   Proof of design testing shall be conducted per paragraph 5.5 and witnessed by a third party inspection agency. Certified copies of this report shall be available upon request.

m. Eccentric plug valves for wastewater service shall be as approved by Chesterfield County's Product and Design Review Committee.

n. If the standard valve provided by a manufacturer does not fully comply with these specifications, but compliance can be attained by providing optional features, then each valve must be permanently marked to indicate the option or options that have been provided. The method of marking valves to indicate that options are included must be approved by the Product and Design Review Committee.

C. SUPPLEMENTAL SPECIFICATIONS

1. Additional Criteria for Polyvinyl Chloride Piping for Water and Sanitary Sewer Systems: Effective September 1, 1991, all PVC piping must meet the following criteria:

a. Cell Classification for Water Pipe shall be 12454-B.

b. Cell Classification for Sewer Pipe shall be 12454-B or 12364-C.

c. Water Pipe (C-900) shall meet the specification requirements and have the following certifications from:

1) FM (Factory Mutual)
2) UL (Underwriters Laboratory)
3) NSF (National Sanitation Foundation)

d. All pipe (sizes - 16" and smaller) shall be furnished with standard industry color coding:

Water - Blue
Gravity Sewer - Green
Force Main Sewer - Brown

e. Manufacturer's Certification of ASTM and AWWA testing requirements will include the following:

1) For Water and Force Main Sewer Pipes (C-900) (4", 6”, 8" and 12”)

a) Each piece has been hydrostatically proof tested to AWWA C-900 Requirements

b) Pipe meets all other applicable ASTM & AWWA C-900 Requirements

2) For Gravity Sewer Pipe (SDR 35) (4"-15")

a) Pipe meets all ASTM D3034 Requirements

b) Pipe meets cell classifications as established by ASTM standards, the County's minimum criteria for plastic pipe, and the certification shall state what the cell classification is.

3) Manufacturer's certification will be signed by an officer of the company and will be furnished to the contractor and/or supplier before pipe is delivered to a project site. Certifications from supplier shall include:

a) County Contract Number

b) Location - Project Name

c) Utilities Contractor Name

d) Pipe type class

e) Manufacturer's name